TECHNICAL NOTE

RANGE TECHNICAL NOTE NO. 4 **APRIL 1, 2015**

PERENNIAL VEGETATION ESTABLISHMENT GUIDE

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1. Seeding Dates

Seeding dates are based on climatic records, research, and experience, and represent optimum periods for grass and/or forb/legume establishment. They vary from north to south and east to west with variation in soil temperatures and moisture conditions. Optimum seeding dates fluctuate annually. The recommended dates will provide for adequate development of adventitious roots (see Figure 1) prior to stressful periods, such as hot, dry summers, and cold, open winters. The dates listed below are averages that may be changed one week in either direction depending on current climatic conditions.

EARLY SPRING PRIOR TO 5/15 – Cool-season species and warm-season species. This is the best period for mixtures of cool- and warm-season grasses and forbs. Weed control as part of seedbed preparation can be accomplished by chemical burn-down or tillage and packing. See Sections 2 and 11 for a more detailed explanation.

LATE SPRING 5/15 TO 6/15 – Warm-season species. ***Do not plant cool-season species during this period***. Optimum period is when sustained soil temperatures reach 60°F. This is the best period for warm-season grasses for similar reasons related to seedbed preparation and weed control as stated above.

LATE SUMMER 8/1 TO 9/1 – Cool-season species only. Seed only if soil moisture is adequate at or near the surface and to a substantial depth. Good for cool-season species on fields with weed management problems. If alfalfa is part of a mixture, seed by August 25. It is essential that alfalfa plants reach the six-leaf stage prior to fall dormancy, for winter survival. Alfalfa requires six-eight weeks growth after emergence to develop the six-leaf stage.

DORMANT 11/1 TO SPRING THAW – Cool-season grasses and switchgrass.

In addition, warm-season grasses or mixtures of cool- and warm-season grasses (with or without forbs) may be seeded at this time when unable to seed during other approved periods, but the following guidance must be met:

- Soil temperature must reach 40°F or less at 10:00 am before the seeding can occur. Information on current South Dakota (SD) soil temperatures is available at http://climate.sdstate.edu/awdn/archive/soilarchive.asp or at http://www.wcc.nrcs.usda.gov/scan/
- Pre-plant tillage may not be performed.
- If excessive cover exists, drill must be equipped with furrow openers or other equipment capable of consistently cutting through residue and ensuring soil-seed contact.

- A minimum of 40% residue cover must be present at the time of seeding. The intent is to provide for erosion control, and to prevent early soil warming and premature germination of warm-season species when a late spring frost may adversely affect these plants.
- Weed growth will not be considered adequate cover for the purpose of reducing spring soil temperatures.
- A cover crop may be used to address the concerns related to dormant-season seeding of warm-season grasses. Refer to Section 10 (Cover and Companion Crops). Note that planting dates for these cover crops do not extend beyond September 1. This is to ensure adequate growth before a fall frost.

Examples of 40 percent ground cover:

2. Seedbed Preparation

New Seedings

A seedbed will be prepared that is free of competing vegetation and is not subject to excessive erosion. A firm seedbed will be provided so the seed is placed at the designed depth. ***The seedbed should be firm enough so that the boot heel of an average adult penetrates the soil to a depth of approximately one-half inch***.

The presence or absence of weed populations, especially noxious weeds, will impact seedbed preparations. Each field should be evaluated for weed pressure. Seeding on fields with significant weed populations will be delayed until weeds are controlled. This may mean a protective cover crop will need to be planted.

When planning a seeding, the previous two years of herbicide application should be considered. Any potential carryover problems should be addressed by delaying seeding, establishing a cover crop, and/or changing species to be planted. If a cover crop is necessary, refer to part 10 of this Technical Note.

Proper seedbed preparation should begin with the previous year's crop. Select a crop in the year prior to planting which is dissimilar to the species to be established. For example, soybean residue produces an excellent seedbed for grass species. Proper selection of crops the year prior to seeding will greatly enhance the success rate of the seeding and reduce seedbed preparation time. Several crops (notably rye, wheat, and alfalfa) are known to produce allelopathic chemicals which inhibit germination and new seedling establishment. Direct seeding into stubble or heavy residue of these allelopathic crops should be avoided (see below). Other commonly grown crops provide good cover and do not inhibit

germination.

In the event that grass seeding follows allelopathic crops (e.g., rye, wheat, alfalfa), residue management becomes important. The degree of crop residue decomposition prior to the next crop affects this allelopathic response. Newly incorporated residues are highly allelopathic while a loss of allelopathy occurs as residues decompose. Therefore, stubble from these crops should be tilled (i.e., burying 25 to 50 percent of the residue) and allowed to overwinter before attempting to establish new seedings. In no-till situations, consider planting a cover crop that will form a canopy over the stubble. This will enhance residue decomposition. For additional information on no-till and cover crop methods, see below and section 10.

Seedbed Alternatives

No-Till Method – Seeding into standing stubble of a previous crop without further seedbed preparation. Excess straw or chaff should be removed prior to seeding. Use of harvest equipment, which spreads straw along a minimum of 80 percent of the header width, will prevent excess chaff problems. If weeds or excessive volunteering of previous crop are present, control with appropriate herbicide(s) in accordance with product label directions and current recommendations from SD State University (SDSU) Cooperative Extension Service. Herbicide recommendations are available at: http://www.sdstate.edu/ps/extension/weed-mgmt/weed-mgmt-pubs.cfm.

Cover Crop Method – Plant a cover crop (high residue producing crop) of oats, barley, flax, grain sorghum, millet, or sudangrass during the growing season before seeding perennial forages if existing cover is insufficient to control erosion. If the cover crop method is to be used, see part 10.

Clean-Till Method – Seed into a new, clean tilled, firmly packed seedbed. If erosion or potential climatic factors are a potential concern, a cover crop should be used. See part 10 if a cover crop is to be used.

Stand Renovation Seedings

It may be desirable to replace an existing stand of introduced grass or grasses and legumes that has declined in vigor or no longer meets objectives. If it is necessary to establish a stand into an existing stand without any tillage operations, then a no-till seedbed may be prepared utilizing herbicides to completely control the existing grasses or grasses and legumes. Existing vegetation is controlled and the new seed is planted directly into the undisturbed sod of the old species.

Prior to attempting this method, excess litter should be removed if necessary, allowing seeding equipment to function properly. The existing stand may be hayed, grazed heavily, or prescribed burned to remove excessive litter. Herbicides are then applied to the regrowth. Glyphospate applied to actively growing plants in the fall of the year is the herbicide method of choice for eradication of cool-season grasses.

A spring follow-up application may be required to gain complete control. If no lush fall growth is present, defer application until the spring. In either case, all existing vegetation should be destroyed prior to drilling the new seeding. The new seeding is drilled directly into the destroyed stand.

This method of seeding is generally not as successful as seeding into a fully prepared

seedbed due to several issues relating to seed to soil contact. It should only be used to renovate stands of introduced grasses, when soil conditions, availability of equipment, program restrictions, and other constraints make the use of a fully prepared seedbed impractical. It should never be used to rejuvenate rangelands. Rangelands are generally best improved through management techniques such as prescribed grazing (please see the Natural Resources Conservation Service (NRCS) Conservation Practice Standard (CPS) Prescribed Grazing (528)).

Stand Enhancement Seedings

It is often the goal of management to attempt to establish new species of grasses and/or legumes directly into existing stands. Established growing stands of grasses or grass/legumes fully utilize all water, soil, and solar resources especially in western portions of SD. Attempting to establish new species into existing stands generally results in failure due to the existing vegetation out competing new seedlings for water and sunlight. Therefore, establishing new species directly into existing growing stands is not recommended.

One exception is the enhancement of existing stands of introduced grasses through the addition of legumes. This practice is only recommended east of the Missouri River. Competition from existing vegetation is reduced either through tillage or herbicides. If tillage is used, it should consist of one chisel followed by one or two diskings. Tillage should be a minimum of three inches deep. If herbicides are used, they should be applied at rates which will temporarily impede the growth of existing vegetation. Legumes are then drilled directly into the tilled or herbicide treated seedbed.

Reinforcement Seeding

Often when a new seeding is completed, portions fail to establish satisfactorily. Thin stands may exist across portions if not all of the stand. Areas of unsatisfactory plant populations may be improved by drilling seed directly into the existing thin portions of the stand. Weeds need to be controlled with herbicides prior to drilling. If excessive litter is present, it may have to be removed by mowing, raking, and removing the vegetation or through prescribed burning.

3. Seeding Equipment

Seeding equipment that ensures proper seed placement and good seed–soil contact will be used. Modern grass seeding attachments that allow for proper seed flow, seed placement, and soil packing are needed to ensure a successful seeding.

Slower seeding speeds should be used for fluffy or rough-coated seed species. Three to five miles per hour should be the seeding speed for most types of grass drills. Seeding speeds in excess of six miles per hour may result in uneven or inconsistent grass and legume stands.

If a carrier is needed to help feed seed through the drill, cracked corn or rolled oats may be added to the mixture.

Drill calibration should be completed for both grass and grain drills prior to seeding. Please refer to item 4 for guidance in completing drill calibration.

Grass Drill

Grass drills are specifically designed and equipped to properly meter and place various grass, legume, and/or forb seed. They share the following design characteristics.

Different seed boxes are normally required to handle the three types of grass seed commonly used. This includes the relatively clean, smooth seed characteristic of many cool-season grasses, the chaffy or trashy seed characteristic of many warm-season grasses, and fine, smooth seed, characteristic of legumes or grasses such as switchgrass, hard fescue, or reed canarygrass.

Seed boxes having the capability of seeding chaffy or awned grasses (i.e., blue grama, bluestems, and Indiangrass,) are needed, only if such species are planned in the seeding mixture; likewise, fine seed or legume seed boxes are needed, only if such species are to be seeded.

Agitators or similar mechanisms prevent bridging of chaffy or trashy seed. They ensure a constant flow of seed at the desired rate. Seed is uniformly mixed.

Feeder mechanisms (picker wheels, fluted feed, etc.,) ensure uniform flow of all types of grass seed either separately or in a mixture.

Oversized feeder tubes that allow constant flow of chaffy or trashy type seed from boxes to placement point (if such seed is used).

Individually mounted, adjustable, spring loaded, double-disc openers.

Depth bands or other depth control systems that provide positive seed placement over varying degrees of seedbed firmness for a final planting depth of one-fourth to three quarters of an inch.

Press/packer wheels provide adequate covering and firming of soil over and around the seed for necessary seed to soil contact after proper seed placement. They can be mounted individually on each furrow opener or independently to follow behind each opener. Press/packer wheels are not intended to provide the basic "firm seedbed." The firm seedbed must exist before the drilling operation begins.

Small Grain Drill

Free-flowing grass seed (i.e., wheatgrasses,) and legume seed can be successfully planted with a small grain drill, provided proper seeding depth can be maintained throughout the field. Seeding depth is the most limiting factor to seeding success and contributes to most of the seeding failures when using a grain drill. It is extremely important to have a firm seedbed when using a grain drill. Periodic inspections should be done to check seeding depth especially when seeding across different soil types. Seeding depth will vary under actual planting conditions.

Checking the drill frequently and hand mixing the seed is essential to achieving a properly blended seed mix and helps ensure that seeds of different sizes are seeded evenly across the field. Periodic feeder mechanism adjustments are usually necessary to ensure proper seeding rates. A separate legume box is desirable for seeding small seeded species (i.e., switchgrass, hard fescue, reed canarygrass, and alfalfa). Ensure that the grain drill's drop tubes are placed in front of the packer wheels to allow for proper seed-soil contact.

Chaffy or awned seeds (i.e., bluestems, Indiangrass, and blue grama,) are extremely difficult to plant with a grain drill. Proper agitation is needed to prevent “bridging” of seed in the

seed box and the feeder mechanism must be capable of metering a uniform flow of seed at the desired rate. Very few grain drills have this capability. Use of debearded seeds is strongly recommended when considering seeding chaffy or awned seeds in a grain drill. It is recommended that a grass drill be used for these types of fluffy seeded grasses.

Broadcast Seeder
Broadcast seeding may only be used when seeding some legume species (i.e., alfalfa, sweetclover,) or when slope, soil conditions, and/or size of the area to be seeded make the use of a drill impractical. Obtaining proper seed depth is very difficult with broadcast seeders. All broadcast seedings will have an operation which incorporates the seed into the soil (i.e., covering operation using a drag harrow, cultipacker, roller packer, or other suitable implement to cover and press the seed into the soil surface). When using the broadcast method, the seeding rates listed in Table 2 will be multiplied by 1.5.

Airseeders
Some airseeders and similar types of equipment may be used to seed free flowing grass seed (i.e., wheatgrasses,) and legume seed if proper seeding depth can be obtained (as specified in item 9). The shallow planting depths for grasses and legumes can be difficult to maintain with this type equipment. The equipment must be able to provide a uniform flow of seed at the desired rate. Use packer wheels or other suitable packing implement to press soil firmly around the seeds.

4. Drill Calibration
Grass or grain drills may be calibrated using the following methods.

Bulk weight method:
Raise the drill's drive wheel and measure its circumference in **feet**. Next, measure the distance between seed spouts or disc openers. Use Table A to determine the number of revolutions (R) to turn the drive wheel for the row spacing and wheel circumference in feet (C) for your drill.

Table A

Row spacing in inches	No. of Seed Spouts to Use	Turns of Drive Wheel	Row spacing in inches	No. of Seed Spouts to Use	Turns of Drive Wheel
6	4	96/C = R	24	1	96/C = R
7	4	82/C = R	30	1	77/C = R
8	3	96/C = R	36	1	64/C = R
10	3	77/C = R	42	1	55/C = R
12	2	96/C = R	48	1	48/C = R

Place enough seed in the box to cover spouts from which you will collect seed. Turn the drive wheel until all spouts are feeding. Place a container under the correct number of seed spouts (as determined from the Table A) and turn the drive wheel the number of revolutions previously determined. Weigh the sample in grams. Multiply this weight by 0.5. The result is the pounds per acre at that setting. Make adjustments in the drill setting and continue trials until the desired seeding rate is obtained. **Remember**: Seeding rates as determined by this method are in terms of **bulk seed**. You need to convert your seeding rate from pure live seed per acre to bulk seed per acre when using this calibration method.

Example:

Row spacing = 7 inches
Number of seed spouts = 4
Circumference of drive wheel = 6.8 feet
Revolutions of drive wheel (R) = 82/C

R = 82/6.8 = 12 revolutions

Bulk seeding rate is 15.1 lbs./ac. The drill is properly set when the 4 seed spouts yield 30 grams of seed after 12 revolutions of the drive wheel.

30 grams X 0.5 = 15 lbs./ac.

Seeds per row foot method

This method of determining the amount of seed being distributed by the seeding equipment is to count the number of seeds per foot of drill row while the machine is in operation.

Fill the drill with seed, make setting, and drive equipment over a hard ground surface or canvas. Count the number of seeds per foot of row and adjust until proper seeding rate is attained. Please use Table B to determine the linear foot of row necessary to equal one square foot planted.

Table B

Row spacing in inches	Linear foot of row to equal one square foot
6	2.0 feet
7	1.7 feet
8	1.5 feet
10	1.2 feet
12	1.0 feet

To determine the proper number of seeds per foot of drill row for a specific seeding mixture; you will first need to calculate the bulk seeding rate for each species in the mix. From Table 2, calculate the number of seeds per square foot (ft.^{2}) for each pound seeded (seeds per pound divided by 43,560 ft.^{2}/acre). Multiply the number of seeds per square foot for each pound seeded by the bulk seeding rate for each species. Total the resulting numbers to determine the number of seeds per square foot for the mixture.

For example, if you want to calibrate a drill for a mixture of 4.5 lbs. pure live seed (PLS)/acre green needlegrass (80 percent purity and 70 percent germination) and 4.0 lbs. PLS/acre western wheatgrass (92 percent purity, and 85 percent germination), calculate the bulk seeding rate for each species. Bulk seeding rate would be 8 lbs./acre for the green needlegrass and 5.1 lbs./acre for the western wheatgrass. Table 2 shows one pound of green needlegrass seed contains 180,000 or 4.1 seeds/ft.^{2} for each pound seeded (180,000/43,560 ft.^{2}/acre). Western wheatgrass has 112,000 seeds per pound or about 2.6 seeds/ft.^{2} for each pound seeded.

8 lbs./acre X 4.1 seeds/ft.^{2} /lb. = 32.8 seeds/ft.^{2}
5.1 lbs./acre X 2.6 seeds/ft.^{2} /lb. = 13.3 seeds/ft.^{2}

The total seeds per square foot for the mix would be 46. If the drill being calibrated has 7-inch row spacing, the drill calibration would be 46 seeds per 1.7 feet of row length.

5. Seed Requirements

All seed must meet the requirements of SD State Seed Laws and Regulations. Information on state seed law is available at: http://legis.sd.gov/rules/DisplayRule.aspx?Rule=12:36
All seed; including homegrown seed, must be officially tested for purity and germination to enable PLS calculations for determining the proper seeding rate. Tests must be made within a nine-month period, exclusive of the test month, prior to seeding. Re-testing of seed is recommended within the nine month period if stored improperly (high humidity and/or high temperature). Information on sending seed to the seed lab at SD State University (SDSU) for testing is available at: http://www.sdstate.edu/ps/seed-lab/index.cfm.

Use certified seed when available.

Origin of nonvarietal ('common') grass seed of both native and introduced species for pasture and hayland planting is limited to North Dakota (ND), SD, Nebraska (NE), Montana (MT), Wyoming (WY), Minnesota (MN), and Iowa (IA).

Foreign seed must be of adapted, named varieties.

Legume seed should be inoculated with the proper culture just prior to seeding in order to increase the potential for nitrogen fixation by the plant.

No noxious weed amounts are allowed on any seed tags.

Recommended varieties for use in SD are included in Table 1.

6. Seeding Rates

All seeding rates will be based on PLS. Pure live seed can be calculated from information on the seed tag. By state law, seed tags must contain certain information. Specific information on seed tag requirements can be found at:
http://legis.sd.gov/rules/DisplayRule.aspx?Rule=12:36

Pure live seed is derived by multiplying percent pure seed by the percent germination (plus percent hard seed, if present) and dividing by 100. For example, if a sample of Indiangrass has a purity of 96 percent and a germination of 74 percent, PLS would be calculated as follows:

(96 X 74)/100 = 71.04 percent PLS per pound of bulk seed

To calculate the pounds of bulk seed required, divide the PLS requirement for the seeding by the percent PLS (expressed as a decimal). For example, if 1,000 pounds of PLS of the above Indiangrass is required for the seeding, the amount of bulk seed to purchase and apply to the field is:

1,000 lbs. of PLS/0.7104 = 1,408 lbs. of bulk seed

Table 2 contains seeding rates for all species approved for use in SD by Major Land Resource Area (MLRA). Figure 2 provides a map showing SD MLRAs.

7. Species Characteristics

Species vary in their ability to tolerate environmental conditions such as drought and flooding. They also vary widely in their ability to establish, recover after a harvest, and persist. Season of growth influences species selection in regards to forage preference and periods of use. Table 3 identifies numerous characteristics for all recommended species.

8. Species Selection and Adaptability by Site for Various Land Uses

Certain species are best adapted to specific site conditions. In order for a seeding to be successful, it should be adapted to the soil, landscape, climatic, and topographic conditions. Seedings are also designed for their specific uses. For example, a seeding designed for the production of hay or intensive spring livestock grazing will contain different species than a seeding which is designed to restore native tall grass prairies. When two or more ecological sites are planned to be seeded with the same mixture a single species can be counted toward the required minimum of species on each ecological site, provided they are eligible species for the included sites.

Table 4 contains species recommendations for Pasture and Hayland Plantings (512). It is sorted by pasture and hayland suitability groups and by forage suitability groups, respectively (groupings of similar soil capabilities), and MLRA. More information detailing specific requirements of this practice can be found in the SD Technical Guide (SDTG) at: http://efotg.sc.egov.usda.gov/efotg_locator.aspx.

Table 5 contains species recommendations for Range Plantings (550). It is sorted by ecological site (ES) (a grouping of similar soil capabilities) and MLRA. More information detailing specific requirements of this practice can be found in the SDTG at: http://efotg.sc.egov.usda.gov/efotg_locator.aspx.

Table 6 contains species recommendations for tall and mixed grass prairie restoration (Restoration and Management of Declining Habitats (643)). It is sorted by ES and MLRA. More information detailing specific requirements of this practice can be found in the SDTG at: http://efotg.sc.egov.usda.gov/efotg_locator.aspx.

Table 7 contains species recommendations for Critical Area Plantings (342). It is sorted by determining soil property (a grouping of similar soil capabilities) and MLRA. More information detailing specific requirements of this practice can be found in the SDTG at: http://efotg.sc.egov.usda.gov/efotg_locator.aspx.

9. Seeding Depth

Proper seeding depth is extremely important in successfully establishing native and introduced vegetation from seed. Native grasses, forbs, and shrubs need to be seeded at a shallow depth, as light plays a key role in the germination of many native species. Optimum seeding depths are one-quarter to three-quarter inch.

10. Cover and Companion Crops

Cover Crops
A cover crop is an annual residue-producing crop, planted during the growing season before seeding the perennial crop. Its purpose is to provide cover and residues to reduce evaporation, maintain cool soil temperatures, reduce weed competition, trap snow, protect seedlings from extreme climatic conditions, and control wind and water erosion.

Cover crops may be used in all MLRAs at the following rates and seeding dates:

Crop	Seeding Rate	Spring Dates	Fall Dates
Barley	25 – 30 lbs./acre	Apr. 15 – June 1	Aug. 15 – Sept. 1
Oats	15 – 30 lbs./acre	Apr. 15 – June 1	Aug. 15 – Sept. 1
Grain sorghum	5 – 10 lbs./acre	May 15 – Aug. 15	
Millet	10 – 15 lbs./acre	May 15 – Aug. 15	
Sudangrass	15 – 20 lbs./acre	May 15 – Aug. 5	

The cover crop will not be allowed to go to boot stage. It should be clipped to 8-10 inches in height, chemically killed prior to boot stage, or late seeded to winter kill in order to prevent seed formation. Remove or spread excess residues that would interfere with the drilling operation of the perennial species.

Companion Crops
A companion crop is an annual that is planted with the perennial species. They will not be used in conjunction with the CPS Range Planting (550). Companion crops are not recommended because of excessive competition with the seeded perennial species. Where erosion is a severe hazard, companion crops may be used in all MLRAs at the following maximum rates. Seeding rates for companion crops are lower than normal seeding rates for those crops to reduce competition with the seeded perennial species.

Barley:	10 lbs. per acre
Oats:	10 lbs. per acre
Spring wheat:	15 lbs. per acre

If used, the companion crop should be clipped and removed before it becomes competitive with the perennial species.

11. Management and Protection During Establishment

Grazing
Do not graze until stand is fully established. This period will be a minimum of one full growing season. If an adequate stand has not established during the first growing season, or if seedlings do not have well-developed root systems with adventitious roots above the sown seed, then deferment should be extended through the second growing season. Flash grazing treatments during the deferment period for weed control will be handled on a case-by-case basis provided no damage will be done to the seeded species.

Weed Control
During the establishment period, excessive amounts of competitive weeds will be controlled. Control weeds that compete with seedlings for sunlight and/or moisture during the growing season of the species planted. The first weed control operation will be needed early in

seedling development or prior to weed seed maturity. Repeated weed control operations may be needed. Competitive weeds can be controlled either mechanically or chemically or by a combination of these methods.

Mechanical – When controlling competitive weeds by clipping or mowing, adjust the equipment to cut above the new seedlings and clip before the weeds set seed. If the clippings are dense enough to smother the new seedlings, promptly remove the clippings from the field.
Chemical – To control competitive weeds with herbicides use the appropriate herbicide(s) applied according to the manufacturer's label. The best control will generally be obtained when weeds are in the early stages of growth. Precautions should be taken to ensure that grass or legume seedlings are not injured by the selected herbicide(s). Please refer to SDSU Agricultural Weed Control Guides for specific herbicide recommendations on forage crops in SD: http://www.sdstate.edu/ps/extension/weed-mgmt/weed-mgmt-pubs.cfm.

Noxious weeds must be controlled in accordance with state law.

Insect Control
Insects can be a threat to seedlings. Contact the county Extension office for recommendations on control of specific insects affecting seeded species.

Caution
When using any pesticides (herbicides or insecticides,) please read and follow the manufacturer's label recommendations. The use of pesticides must be consistent with the label and in accordance with state and federal laws and regulations.

12. Guidance for Critical Area Planting (342)

Site Preparation
Follow guidance for seedbed preparation (number 2 above) and the additional following criteria.

If necessary, divert offsite water away from the critical area. This may require a permanent conservation practice, or in other instances, a temporary measure that will be effective during the period of establishment.

Where practical, grade to permit the use of conventional equipment for seedbed preparation, seeding, mulch application, and anchoring. Cabling of equipment to prevent rollover may be necessary on some slopes such as newly constructed dams.

On construction sites where the exposed and underlying soil material will not support adequate vegetation, minimum topsoil dressing of six inches will be applied as part of construction.

After construction is complete, the seedbed will be worked to a depth of three to five inches to break up compacted areas and permit rapid root development. Drag or pack to break up large clods and firm the seedbed.

Where slopes are steeper than 1.5:1, use some means other than vegetation to stabilize slopes.

Species Selection
Allowable species will be selected from Table 7 for the appropriate MLRA.

A minimum of 75 percent of the mixture will be made up of sod forming species. The mixture will contain a minimum of two or more grass species in equal proportions except that smooth bromegrass may be used as a single species in the following MLRAs: 102A, 102B, 102C, 53B, 53C, 55B, 55C, 63B, 66, and 62.

Single species may be used on saline or wet areas (refer to Table 7).

Grass mixtures may include all native grasses, all introduced grasses, or a mixture of native and introduced species except that smooth bromegrass may not be mixed with native species.

Do not select aggressive species such as smooth bromegrass when the adjacent area is dominated by native species.

When quick growth and/or protection of a critical area is needed, a quick establishing grass can be added in addition to the selected permanent seeding mixture. Use either slender wheatgrass or annual ryegrass. Slender wheatgrass can be used statewide and annual rye grass can be used in MLRAs 102A, 102B, 102C, 53B, 53C, 55B, 55C, 63B, 66, and 62. Add a maximum of three PLS pounds per acre of slender wheatgrass or a maximum of two PLS pounds per acre of annual ryegrass to the selected full seeding.

Conventional Seeding
Seeding activities will follow recommendations found elsewhere in this technical note unless otherwise stated in this section.

Seeding rates will be 1.5 times those recommended in Table 2 when using a drill (recommended rate multiplied by 1.5).

When possible, drilling will be accomplished perpendicular to the slope. On grassed waterways, drilling will follow a serpentine pattern.

Broadcasting
Many critical area plantings are too steep or too small to efficiently and safely utilize a drill. In these cases, seed may be broadcast and incorporated by harrowing, packing, or raking by hand. When broadcast seeding, increase the seeding rates found in Table 2 by two times (recommended rate multiplied by two).

Hydroseeding
On sites that are too steep for regular equipment to operate, the use of a hydroseeder is an acceptable alternative. Seed, fertilizer, and mulch materials will be applied in one operation. Limit the application of 150 pounds of solids per 100 gallons of water. If a legume seed is included in the mixture, any lime or fertilizer should be applied separately. A second trip may also be needed to apply an asphalt emulsion to long fiber mulches.

When using hydroseeding technique, increase seeding rates found in Table 2 by a factor of two (recommended rate multiplied by two).

Sodding
Sod may be used on areas requiring immediate cover to prevent erosion. The sod should be in strips or blocks of native grass mixture, switchgrass, prairie cordgrass, reed canarygrass, or other suitable grasses. Bluegrass sod is to be used only when the areas is irrigated and is desired for aesthetic purposes. Sod materials are to be taken from solid, thick growing stands.

Sod will be cut in strips of uniform width and to a uniform thickness of at least three inches for tall grass and ½ to 1½ inches for short grasses. Lay sod within 24 hours after it was cut.

Sod strips should be carefully placed in rows across (at right angles) to the direction of slope. The sod strips will be placed together tightly so that no open joints are left between the strips or between the end of strips. Joints between the end strips will be staggered. Any spaces between the joints will be filled with topsoil and all edges covered with topsoil at least two inches deep. The edge of the sod at the top of slopes will be turned under and a layer of soil compacted over the edge so as to conduct surface water over and onto the top of the sod. The sod will be well tramped to help it remain in place.

Fertilizing
Do not fertilize predominantly warm-season grass seeding unless the soil material is very infertile.

Thoroughly mix all fertilizer into the upper three to five inches of the soil during final seedbed preparation.

Apply fertilizer based on the recommendations from a soil test or apply 30 to 40 pounds of actual N and 40 to 60 pounds of P_20_5 per acre. Ten to 15 tons of manure per acre may be used in lieu of the commercial fertilizer and will also increase organic matter.

On medium textured soils, the addition of 5 to 10 pounds of zinc per acre may speed up growth.

Mulching
All mulching will be done in accordance with the SD CPS for Mulching (484).

Mulching of critical area plantings is required for any of the following conditions:

Where seeding cannot be accomplished during the approved seeding periods and a cover crop is not used;

On grassed waterways, where a cover crop or companion crop is not used and seeding is placed on a bare seedbed, and the design velocity is more than 2.5 feet per second;

Where a grassed waterway is established at the time of terrace construction, and the channel slope is two percent or greater;

On slopes 3:1 or steeper that are 10 feet or more in vertical height or longer than 20 feet;

On cut south and west facing slopes;

On all saline and alkaline areas.

Drill grass in the prepared seedbed, immediately prior to mulching or at the next suitable seeding period after mulching.

Establishment of Woody Vegetation
The addition of trees and/or shrubs in the critical area may be used as appropriate to further reduce erosion, aesthetically enhance the site, or provide wildlife habitat. Any tree or shrub planting will follow the CPS Tree and Shrub Planting (612) in the SDTG.

Trees and/or shrubs will only be utilized in areas where they are a naturally occurring component of the plant community.

Management of Critical Areas During and After Establishment
Weeds will be controlled as described elsewhere in this technical note.
All use will be excluded until vegetation is well established.

Mow grassed waterways for hay annually after establishment. Other critical areas may be mowed as needed for stand maintenance.

Fertilize as necessary to maintain stand.

Inspect critical areas each spring and following heavy rain. Reshape and reseed eroded areas promptly. Reinforce grass seeding where stands are thin.

Manage any grazing use to ensure long-term survival of the stand

Lift tillage implements and shut off sprayers when crossing critical areas. Do not till parallel to grassed waterways.

Avoid vehicular travel on critical areas.

Providing Food, Cover, and Shelter for Wildlife
Wildlife habitat should be considered when developing critical area planting plans and species selection. For plant species to improve wildlife habitat, refer to the SD CPS Upland Wildlife Habitat Management (645).

13. Guidance for Vegetated Treatment Areas (635)

Species Selection
At least three species is recommended to be included in each mixture and one of these should be tolerant to flooding and/or saturated conditions such as creeping foxtail, reed canarygrass, etc.

If salts/salinity is a potential concern (electrical conductivity (EC) >4.0 mmhos/cm, or a sodium adsorption ratio (SAR) >10), then at least one salt/saline tolerant grass should be included such as slender wheatgrass, tall wheatgrass, etc.

Sod forming grasses are preferred; however, bunch grasses can be included in mixtures which include at least two sod forming species.

Since most flow will occur during the spring and early summer months it is advisable to use cool-season grasses for a majority of the mix. If warm-season grasses are to be included, consider developing cells within the vegetated treatment area and seed one or more cells to a dominant mixture of warm-season species.

Species that are desirable as forage for hay are advantageous since that will be the preferred method of biomass removal.

Species with large, fibrous root masses are desirable; whereas, species with large tap roots are not desirable because they increase the chance of preferential flow.
Including legumes in the mixture is only recommended in areas where rodents such as pocket gophers will not compromise the integrity of the vegetated treatment area. Adding legumes to mixtures may help alleviate compaction layers that develop during grading and shaping activities. Legumes may be added to initial seeding at no more than 10 percent of total rate. If necessary, legumes can be removed with herbicides after initial compaction has been alleviated (two to four years).
All species selected must be adapted to the site (refer to Table 2 and Table 7 for adaptability ratings). An exception to this is orchardgrass. Since these areas will be receiving additional moisture, orchardgrass may be used on vegetated treatment areas statewide where it is otherwise adapted to the soil texture, salinity, and wetness of the site.

The following table lists potential species to consider for vegetated treatment areas.

	Season of Use	Flood Tolerance	Salt Tolerance	Estimated Nitrogen Uptake/ton
big bluestem	Su	Good	Poor	20 lbs./ton***
creeping foxtail	Sp, Su, F	Very good*	Poor	29 lbs./ton***
intermediate wheatgrass	Sp	Fair	Fair	28 lbs./ton***
meadow brome	Sp, F	Fair	Poor	35 lbs./ton***
orchardgrass	Sp, Su, F	Poor	Poor	29 lbs./ton***
pubescent wheatgrass	Sp, F	Fair	Fair	28 lbs./ton***
reed canarygrass	Sp, Su	Very good*	Poor	27 lbs./ton***
smooth bromegrass	Sp, F	Good	Poor	39 lbs./ton***
switchgrass	Su, F	Good	Fair	23 lbs./ton***
tall wheatgrass	Sp, F	Good	Good**	28 lbs./ton
western wheatgrass	Sp, Su	Good	Good**	28 lbs./ton
alfalfa	Sp, Su	Poor	Poor	45 lbs./ton***
birdsfoot trefoil	Sp, Su	Fair	Poor	50 lbs./ton***
red clover	Sp, Su	Fair	Poor	40 lbs./ton***

*Include one of these species if flooding or saturated soil conditions are anticipated.
**Include one of these species if high salt/salinity conditions are anticipated.
***Good choices for uptake of high levels of nitrogen.
Sp – Spring; Su – Summer; F – Fall

Table 8 contains seeding mixtures meant to offer suggestions on what would be considered a suitable mixture for vegetated treatment areas. All mixtures should be adapted to suit the

predominant ecological site/soils of the vegetated treatment area, and take into consideration how engineering modifications may change the site's hydrology, soil structure, etc.

Seeding Rate, Seeding Methods, and Maintenance
Seeding activities will follow recommendations found elsewhere in this technical note with the following exceptions:

Seeding rates for vegetated treatment areas will be four times the rate in Table 2 (recommended rate in Table 2 multiplied by four), and;

All seeding, mowing, and haying activities should be conducted perpendicular to flow to prevent rills and gullies from forming.

14. Guidelines for Stand Evaluation

To determine adequacy of stands and to determine if reseeding or reinforcement seeding is required, please follow Range Technical Note No. 1 "Guidelines for Herbaceous Stand Evaluation," it's accompanying worksheet, SD-ECS-10, and the following guidelines. The technical note and worksheet may be obtained at: http://efotg.sc.egov.usda.gov/efotg_locator.aspx.

It should be recognized that environmental factors, such as, climate, insects, soils, and fertility affect the time required for stand establishment. Timeliness of precipitation, drought, extreme temperatures, severe winds, or late soil thaw can delay seedling emergence and/or development.

The adequacy of a stand will be based on density of established plants and stage of morphological development. To be considered established, a grass plant must have a well developed adventitious root system and should exhibit signs of tillering or rhizome development. Please see Figure 1. An alfalfa plant must have a well-developed taproot with secondary and tertiary roots and a well-developed crown set below the soil surface and/or branch rhizome.

Preliminary stand evaluation can be made four to eight weeks after germination; evaluate for progress and management problems (i.e., weeds, insects, etc.,) not for final establishment.

Generally, all stands must go through at least one winter before making final stand evaluation.

Stands resulting from late fall (dormant) or spring seedings should go through the first growing season and subsequent winter; evaluation for final establishment may be made any time during the second growing season.

Stands resulting from late summer seeding generally cannot be evaluated for final establishment until the end of subsequent, full growing season.

If evaluation reveals a marginal stand, consideration should be given to allowing a second growing season for establishment. Seedings that contain a high percentage of "hard seed" are more likely to produce new seedlings during the second growing season.

The alternative of a partial reinforcement seeding, in lieu of the full seeding rate, should be

considered during the evaluations.

"Spot" seeding weak areas may be a logical alternative in the case of spotty or intermittent stands, in lieu of whole field reseeding. Use exclusion should follow spot seedings.

Table 1. Approved Named Varieties

Species		Recommended Varieties for South Dakota
		Origin of nonvarietal ('common') grass seed of both native and introduced is limited to ND, SD, NE, MT, WY, MN, and IA. If species and/or variety is not listed no known recommended variety is known to occur and nonvarietal ('common') seed must be used.
Introduced Cool-Season Grasses:		
Bromegrass	meadow	AC Knowles, Cache, Fleet, MacBeth, Montana, Paddock, Regar
	smooth [3/]	AC Rocket, AC Knowles hybrid, Carlton, Signal, Magna, Manchar, Badger, Radisson, Rebound, Barton, Baylor, Saratoga, Lincoln, Cottonwood, Bravo, Jubilee, Polar, Elsberry
Creeping foxtail		Retain, Garrison
Hard fescue		Discovery, Aurora, Reliant, Durar
Orchardgrass		Chinook, Latar, Paiute, Dawn, Rancho, Kay, Potomac, Penlate
Tall fescue		Barcel, Barvetia, Fawn, Kentucky 31, Martin, Mozark, Phyter, Southern Cross, Stargrazer, Tuscany II
Timothy		Climax, Itasca, Winmor, Hopkins, Drummond
Wheatgrass	bluebunch/quackgrass hybrid	NewHy, AC Saltlander
	crested	
	crested – Standard	Nordan, Summit
	crested – Fairway	Ephraim, Ruff, Parkway, NU-ARS-AC2, RoadCrest, Douglas
	crested - Hybrid	HyCrest, HyCrest II
	intermediate	Manifest, Haymaker, Beefmaker, Reliant, Clarke, Slate, Chief, Oahe, Rush, Amur, Greenar, Tegmar
	pubescent	Manska, Greenleaf, Mandan 759, Luna, Topar
	Siberian	Vavilov, P-27
	tall	Orbit, Platte, Jose, Alkar
Wildrye	Altai	Mustang, Pearl, Eejay, Prairieland
	Dahurian	Arthur, James
	Mammoth	Volga
	Russian	Bozoisky II, Mankota, Tetracan, Bozoisky Select, Swift, Cabree, Mayak
All others		Common
Native Cool-Season Grasses:		
Alkaligrass		Chaplin, Fults, Quill
Green Needlegrass		AC Mallard Ecovar, Lodorm
Mountain brome		Bromar
Reed canarygrass		Palaton, Venture, Vantage, Rise, Ioreed, Frontier
Wheatgrass	bluebunch	Anatone, Goldar, P-7 Selected Germplasm, Secar, Whitmar
	bearded	AC Pintail Ecovar, AC Sprig Ecovar
	slender	FirstStrike, AEC Hillcrest, Adanac, Pryor, Elbee, Revenue, Primar
	streambank/thickspike	Bannock, Critana, Sodar
	western	Rodan, Walsh, Flintlock, Rosana, Arriba, Recovery
Wildrye	basin	Washoe Germplasm, Trailhead, Magnar
	beardless	Shoshone
	Canada	Mandan
	Virginia	Omaha
All others		Common

Table 1. Approved Named Varieties (Continued)

Species		Recommended Varieties for South Dakota
Native Warm-Season Grasses:		
Bluestem	big	Sunnyview, Bison, Bonilla, Champ, Rountree, Bonanza
	little	Badlands, Itasca, Blaze, Camper
	sand	Cherry, Goldstrike, Garden
Buffalograss		Bismarck ecotype (veg.), Plains, Tatanka
Grama	blue	Bad River
	sideoats	Pierre, Butte
Indian ricegrass		Rimrock, Nezpar
Indiangrass		Chief, Tomahawk, Holt, Nebraska 54
Inland saltgrass		
Prairie cordgrass		Red River
Prairie sandreed		Goshen, Pronghorn
Switchgrass		Forestburg, Nebraska 28, Pathfinder, Summer, Trailblazer, Sunburst, Dakotah
All others		Common
Native Grass-Likes:		
All		Common
		Nonvarietal ('common') native forbs and legumes will originate or be grown in ND, SD, NE, MT, WY, ID, WA, OR, MN, WI, and IA; AB, BC, MB, ON, and SK, Canada.
Native Legumes/Forbs:		
Lewis flax		Appar
Canada milkvetch		Sunrise
Purple coneflower		Bismarck
Cudweed sagewort		Summit
Maximilian sunflower		Medicine Creek
Purple prairie clover		Bismarck
Stiff sunflower		Bismarck, Kaneb
White prairie clover		Antelope
All others		Common
Introduced Legumes:		**Fall Dormancy Rating or Winter Survival Index (WSI) of Three or Less[1/]**
Alfalfa[2/]		
Birdsfoot trefoil		Leo, Empire, Viking, Norcen, Dawn, Fergus
Cicer milkvetch		Lutana, Monarch, Windsor
Clover	red	Kenland, Mammoth
Sainfoin		Eski, Remont, Shoshone, Delaney
Small burnet		Delar
All others		Common
Shrubs:		
Buffaloberry		Sakakawea
Fourwing saltbush	dewinged	Wytana, Snake River
All others		Common

[1/]The following web site is approved for use in determining approved alfalfa varieties http://www.alfalfa.org/falldormancy.html. Varieties must have a fall dormancy rating or WSI of three or less to meet specifications. Alfalfa varieties not listed on this Web site will require documentation from the distributor or developer to determine suitability.

[2/]A partial list of grazeable type alfalfas can be found at "Developing Alfalfa Adapted to Grazing in the Northern Great Plains" available at http://www.ag.ndsu.nodak.edu/streeter/forage_research_index.htm.

[3/] Smooth bromegrass can originate from any locale.

Table 2. Full Seeding Rates

Species	Growth Characteristics[1/,2/]	Seeds/Pound	MLRA 53B/C, 55B/C, 56, 62, 63B, 66, 102A/B/C[3/] Seeds/SqFt	#PLS/Ac	MLRA 54, 63A, 64 65, 58D, 60A, 61[3/] Seeds/SqFt	#PLS/Ac
Introduced Cool-Season Grasses						
Bromegrass						
Meadow	B/M	80,000	30	16.5	25	13.5
Smooth	R/M	135,000	25	8	20	6.5
Creeping foxtail	R/M	750,000	60	3.5	60	3.5
Hard fescue	B/S	565,000	50	4	35	3
Orchardgrass [4/]	B/M	654,000	50	3.3	NR	NR
Timothy [4/]	B/M	1,300,000	30	1	NR	NR
Tall fescue [4/]	R/M	227,000	30	6	NR	NR
Wheatgrass						
Bluebunch-	B/M	135,000	46	14	33	10
Quackgrass/bluebunch hybrid	R/M	130,000	28	9.5	23	7.5
Crested	B/M	175,000	28	7	25	6
Intermediate	R/M	88,000	20	10	17	8.5
Pubescent	R/M	88,000	20	10	17	8.5
Siberian	R/M	175,000	30	7.5	25	6
Tall	B/T	79,000	23	12.5	20	11
Wildrye						
Altai	B/M	68,000	30	19	25	16
Dahurian	B/M	86,000	20	10	17	8.5
Mammoth	R/T	55,000	30	24	25	20
Russian	B/M	175,000	30	7.5	25	6
Native Cool-Season Grasses						
Alkaligrass	B/S	2,108,000	50	1	50	1
American mannagrass	R/T	1,280,000	45	1.5	45	1.5
Bluejoint reedgrass	R/M	4,480,000				
Fowl bluegrass	B/M	3,156,000	70	1	70	1
Green needlegrass	B/M	180,000	30	7.5	25	6
Mountain brome	B/M	90,000	30	15	NR	NR
Needleandthread	B/M	115,000	25	9.5	25	9.5
Porcupine grass	B/M	57,000	25	19	25	19
Prairie Junegrass	B/S	2,315,000	50	1	50	1
Reed canarygrass	R/T	530,000	40	3.5	40	3.5
Wheatgrass						
Bluebunch	B/M	140,000	NR	NR	25	8
Slender	B/M	155,000	25	5.5	17	5
Streambank/Thickspike	R/M	155,000	30	8.5	25	7
Western	R/M	112,000	25	10	20	8
Whitetop	R/T	191,000	11	2.4	NR	NR
Wildrye						
Basin	B/T	140,000	NR	NR	25	8
Beardless	R/M	150,000	30	8.5	25	7.5
Canada	B/M	115,000	20	7.5	17	6.5
Virginia	B/M	96,000	30	13.5	NR	NR

Table 2. Full Seeding Rates (Continued)

Species	Growth Characteristics[1/,2/]	Seeds/Pound	MLRA 53B/C, 55B/C, 56, 62, 63B, 66, 102A/B/C[3/] Seeds/SqFt	#PLS/Ac	MLRA 54, 63A, 64 65, 58D, 60A, 61[3/] Seeds/SqFt	#PLS/Ac
Native Warm-Season Grasses						
Alkali sacaton	B/M	1,758,000	50	1.2	50	1.2
American sloughgrass	St/S	1,150,000	25	0.9	25	0.9
Bluestem						
Big	R/T	176,000	30	7.5	25	6
Little	B/M	286,000	30	4.5	25	4
Sand	R/T	113,000	30	12	25	9.5
Buffalograss	St/S	50,000	30	26	25	23
Grama						
Blue	B/S	750,000	40	2.5	30	2
Sideoats	R/S	180,000	30	7.5	25	6
Indian ricegrass	B/M	235,000	30	5.5	25	4.5
Indiangrass	R/T	193,000	30	7	25	5.5
Inland saltgrass	R/S	520,000	25	2	25	2
Prairie cordgrass	R/T	183,000	30	7	30	7
Prairie sandreed	R/T	275,000	30	5	25	4
Prairie dropseed	B/M	224,000	25	5	25	5
Sand dropseed	B/M	5,680,000	70	0.5	70	0.5
Switchgrass	R/T	390,000	40	4.5	30	3.5
Native Grass-likes						
Fox sedge (Carex vulpinoidea)	B/S	1,600,000	37	1	37	1
Slough sedge (Carex atherodes)	R/M	230,490	25	4.7	25	4.7
Native Forbs and Legumes						
American licorice	E/P/R	58,000	25	18.8	25	18.8
American vetch	Pr/P	30,000	25	36	25	36
Black-eyed susan	E/P	1,450,000	25	0.8	25	0.8
Blanket flower	E/P	157,000	25	7	25	7
Blue verbane (V.hastata)	E/P	1,488,000	34	1	34	1
Boneset	E/P	2,560,000	25	.4	25	.4
Broadbeard beardtongue	E/P	313,000	25	3.5	25	3.5
Butterfly milkweed	E/P	67,000	25	16.2	25	16.2
Lewis flax	E/P	287,000	25	3.8	25	3.8
Canada milkvetch	E/P	266,000	25	4	25	4
Canada tick trefoil	E/P	88,000	25	12.3	25	12.3
Common milkweed	E/P	64,000	25	17	25	17
Compass plant	E/P	10,560	10	40	10	40
Coneflower						
Grayhead	E/P/T	625,000	25	1.7	25	1.7
Prairie (yellow)	E/P	737,000	25	1.5	25	1.5
Purple	E/P	120,000	25	9	25	9
Cudweed sagewort	E/P/R	4,000,000	25	0.3	25	0.3
Culvers root	E/P	12,800,000	60	.2	60	.2
Cup plant	E/P/T	22,400	10	19	10	
Dotted gayfeather	E/P	136,000	25	8	25	8
Dwarf indigo	E/P	160,000	25	6.8	25	6.8
False boneset	E/P	512,000	25	2	25	2

Table 2. Full Seeding Rates (Continued)

Species	Growth Characteristics[1/,2/]	Seeds/Pound	MLRA 53B/C, 55B/C, 56, 62, 63B, 66, 102A/B/C[3/] Seeds/SqFt	#PLS/Ac	MLRA 54, 63A, 64 65, 58D, 60A, 61[3/] Seeds/SqFt	#PLS/Ac
Native Forbs and Legumes (cont.)						
False gromwell	E/P	24,000	25	20	25	20
False sunflower	E/P	60,000	25	18	25	18
Fragrant giant hyssop	E/R	1,440,000	25	.8	25	.8
Fuzzytongue penstemon	E/P	600,000	25	2	25	2
Geyer's aster	E/P	1,014,000	30	1.5	30	1.5
Golden alexanders	E/P	176,000	25	6.2	25	6.2
Gray goldenrod	E/P	4,800,000	40	.4	40	.4
Groundplum milkvetch	Pr/P	83,200	25	13	25	13
Heath aster	E/P/R	3,200,000	40	.5	40	.5
Hoary vervain	E/P	448,000	25	2.4	25	2.4
Illinois bundleflower	E/P	60,000	25	18	25	18
Illinois tick trefoil	E/P	68,800	25	15.8	25	15.8
Indian blanket	E/P	153,000	25	7.1	25	7.1
Indian breadroot scurfpea	Pr/p	17,600	10	24.8	10	24.8
Ironweed	E/P	384,000	25	2.8	25	2.8
Joe-pye weed	E/P	1,520,000	25	.7	25	.7
Maximilian sunflower	E/P/R	250,000	25	4.5	25	4.5
Meadow blazing star	E/P	160,000	25	6.8	25	6.8
New England aster	E/P/R	1,300,000	25	.8	25	.8
Plains coreopsis	E/A	1,650,000	25	0.7	25	0.7
Prairie cinquefoil	E/P	3,680,000	40	.5	40	.5
Prairie spiderwort	E/P	160,000	25	7	25	7
Purple coneflower (E. angustifolia)	E/P	120,000	25	9	25	9
Purple prairie clover	E/P	290,000	25	3.8	25	3.8
Rocky Mountain bee plant	E/P	64,000	20	13.5	20	13.5
Rough blazing star	E/P	256,000	25	4.3	25	4.3
Round-headed bush clover	E/P	128,000	25	8.5	25	8.5
Scarlet globemallow	E/P	500,000	25	2	25	2
Shell-leaf penstemon	E/P	273,000	25	4	25	4
Showy goldenrod	E/P	1,520,000	25	0.7	25	0.7
Showy partridgepea	E/A	43,200	20	20	20	20
Stiff goldenrod	E/P	771,800	25	1.4	25	1.4
Stiff sunflower	E/P/R	85,000	25	12.8	25	12.8
Swamp milkweed	E/P	72,000	25	15	25	15
Tall meadow rue	E/P	176,000	25	6.2	25	6.2
Thickspike gayfeather	E/P	136,000	25	8	25	8
Water plantain	Pr/P	960,000	25	1.1	25	1.1
Western yarrow	E/P/R	2,800,000	25	0.4	25	0.4
White prairie aster	E/P	496,000	25	2.2	25	2.2
White prairie clover	E/P	278,000	25	3.9	25	3.9
Wild bergamot	R/P	1,200,000	25	.9	25	.9
Introduced Legumes						
Alfalfa	E/P	210,000	30	6.5	25	5.5
Alsike clover	Pr/P	680,000	50	3	50	3
Birdsfoot trefoil	Pr/P	418,000	50	5	NR	NR
Black medic	E/A	280,000	25	4	25	4
Cicer milkvetch	Pr/P	134,000	30	10	25	8
Ladino white clover	Pr/P	800,000	25	1.5	25	1.5

Table 2. Full Seeding Rates (Continued)

Species	Growth Characteristics[1/,2/]	Seeds/Pound	MLRA 53B/C, 55B/C, 56, 62, 63B, 66, 102A/B/C[3/] Seeds/SqFt	MLRA 53B/C, 55B/C, 56, 62, 63B, 66, 102A/B/C[3/] #PLS/Ac	MLRA 54, 63A, 64 65, 58D, 60A, 61[3/] Seeds/SqFt	MLRA 54, 63A, 64 65, 58D, 60A, 61[3/] #PLS/Ac
Introduced Legumes (continued)						
Red clover	Pr/P	275,000	30	5	NR	NR
Strawberry clover	E/P	300,000	25	3.5	25	3.5
sweetclover	E/Bi	260,000	25	4	20	3
Hairy vetch	Pr/A	20,000	30	6.5	25	5.5
Sainfoin	E/P	22,000	30	6	25	5
Small burnet	E/P	42,200	20	20	20	20
Native Shrubs						
Big sagebrush	E/P/M	2,000,000	N/A	N/A	23	.5
Buffaloberry	E/P/R	41,000	4	4.2	4	4.2
Chokecherry	E/P/R	5,000	3	26	3	26
Currant	E/P	240,000	30	5.5	25	4.5
False indigo	E/P	52,000	30	25	25	21
Fourwing saltbush						
Dewinged	E/P	52,000	7	6	7	6
Fringed sagewort	E/P/M	4,536,000	21	.2	21	.2
Gardner saltbush	E/P	110,000	30	12	25	10
Juneberry	E/P/R	82,000	30	16	25	13
Leadplant	E/P	200,000	30	6.5	25	5.4
Prairie rose	E/P/R	45,000	30	29	25	24
Sand sagebrush	E/P/S	2,000,000	N/A	N/A	23	.5
Silver sagebrush	E/P/M	1,132,000	N/A	N/A	26	1.0
Western snowberry	E/P/R	74,400	30	17.5	25	14.6
Winterfat	E/P	150,000	30	8.5	25	7

[1/]For additional information see http://plants.usda.gov/.

[2/]Abbreviation	Growth characteristic
A	Annual
B	Bunch
Bi	Biennial
E	Erect
M	Mid 18" - 36"
P	Perennial
Pr	Prostrate
R	Rhizomatous
S	Short <18"
St	Stoloniferous
T	Tall >36"

[3/]See Figure 2 for a map of the MLRAs of SD.
[4/]Adapted for use only in MLRAs 102A, 102B, and 102C, and alone or in combination up to 30% as part of a mix in MLRA 55C.

Table 3. Species Characteristics

Species	Drought Tolerance[1/]	Flood Tolerance[2/]	Salt Tolerance[3/]	Recovery After Harvest[4/]	Season of Use[5/]	Longevity[6/]	Grazing Preference[7/]	Stand Estab-lishment[8/]
Introduced Grasses								
Bromegrass								
Meadow	Fair	Fair	Poor	Good	Sp, F	Medium	High	Medium
Smooth	Fair	Good	Poor	Good	Sp, F	Long	High	Rapid
Creeping foxtail	Poor	Good	Poor	Good	Sp, Su, F	Long	High	Medium
Hard fescue	Good	Fair	Fair	Good	Sp, F	Medium	Medium	Medium
Orchardgrass	Good	Poor	Poor	Good	Sp, Su, F	Medium	High	Rapid
Timothy	Poor	Good	Poor	Good	Sp, F	Short	Medium	Rapid
Wheatgrass								
bluebunch/quackgrass hybrid	Fair	Good	Good	Good	Sp	Long	High	Medium
crested	Good	Poor	Fair	Fair	Sp, F	Long	Medium	Rapid
intermediate	Fair	Fair	Fair	Fair	Sp	Long	High	Medium
pubescent	Fair	Fair	Fair	Fair	Sp	Long	High	Medium
Siberian	Good	Poor	Fair	Fair	Sp, F	Long	Medium	Rapid
tall	Fair	Good	Good	Fair	Sp, F, W	Medium	Low	Medium
Wildrye								
Altai	Fair	Good	Fair	Poor	Sp, F, W	Medium	Medium	Slow
Dahurian	Fair	Fair	Fair	Good	Sp	Short	Medium	Rapid
Mammoth	Good	Poor	Fair	Fair	Sp	Long	Low	Slow
Russian	Good	Fair	Fair	Good	Sp, F, W	Medium	High	Medium
Native Cool-Season Grasses								
American mannagrass	Poor	Good	NR	NR	NR	NR	NR	NR
Bluejoint reedgrass	NR	NR	NR	NR	NR	NR	NR	NR
Fowl bluegrass	Poor	Good	Poor	Poor	Sp, Su	Medium	Low	Medium
Green needlegrass	Good	Fair	Fair	Good	Sp, F	Long	High	Medium
Mountain brome	Medium	Poor	Fair	Poor	Sp, Su	Medium	High	Rapid
Needleandthread	Good	Fair	Fair	Fair	Sp	Long	Medium	Slow
Nutall alkaligrass	Poor	Good	Good	Fair	Sp	Long	High	Slow
Porcupine grass	Good	Fair	Fair	Good	Sp	Long	Medium	Slow
Prairie Junegrass	Good	Poor	Poor	Poor	Sp	Long	High	Slow
Reed canarygrass	Fair	Good	Poor	Good	Sp, Su	Long	High	Medium

Table 3. Species Characteristics (Continued)

Species	Drought Tolerance[1/]	Flood Tolerance[2/]	Salt Tolerance[3/]	Recovery After Harvest[4/]	Season of Use[5/]	Longevity[6/]	Grazing Preference[7/]	Stand Estab-lishment[8/]
Wheatgrass								
bluebunch	Good	Poor	Poor	Fair	Sp, Su, F	Long	High	Medium
slender	Good	Poor	Good	Fair	Sp, Su	Medium	High	Rapid
Streambank	Good	Poor	Fair	Fair	Sp, Su, F	Long	High	Medium
thickspike								
western	Good	Good	Good	Fair	Sp, Su, F	Long	High	Medium
Whitetop	Poor	High	Poor	Fair	Sp, Su	Medium	High	Medium
Wildrye								
basin	Good	Fair	Fair	Fair	Sp, F	Long	High	Slow
beardless	Fair	Fair	Good	Poor	Su, F	Long	Medium	Slow
Canada	Fair	Good	Fair	Fair	Sp, F	Short	Medium	Rapid
Virginia	Fair	Fair	Poor	Poor	Sp	Short	Medium	Medium
Native Warm-Season Grasses								
Alkali sacaton	High	Fair	Good	Fair	Sp, Su	Medium	Medium	Slow
American sloughgrass	Poor	High	Medium	Poor	Sp, Su	Medium	Low	Rapid
Bluestem								
big	Fair	Good	Poor	Good	Su	Long	High	Slow
little	Good	Poor	Fair	Fair	Su, F	Long	Medium	Medium
sand	Good	Fair	Poor	Fair	Su, F	Long	High	Slow
Buffalograss	Good	Poor	Good	Fair	Su	Long	High	Medium
Grama								
blue	Good	Poor	Fair	Poor	Su	Long	High	Medium
sideoats	Good	Poor	Fair	Fair	Su, F	Long	High	Medium
Indian ricegrass	Good	Poor	Poor	Fair	Su	Long	High	Slow
Indiangrass	Fair	Good	Poor	Good	Su, F	Long	High	Medium
Inland saltgrass	Fair	Good	Good	Slow	Sp, Su, F	Long	Low	Slow
Prairie cordgrass	Poor	Good	Good	Fair	Sp	Long	Medium	Slow
Prairie sandreed	Good	Poor	Poor	Fair	Su, F	Long	Medium	Slow
Prairie dropseed	Fair	Good	Poor	Fair	Su	Long	Medium	Slow
Sand dropseed	Good	Poor	Poor	Poor	Su	Short	Low	Rapid
Switchgrass	Fair	Good	Fair	Fair	Su, F	Long	Medium	Medium
Native Grass-Likes								
Fox sedge	Poor	Fair	Poor	Poor	Sp	Long	Medium	Medium
Slough sedge	Poor	Good	Poor	Poor	Sp, Su	Long	Low	Slow

Table 3. Species Characteristics (Continued)

Species	Bloom Period	Drought Tolerance[1/]	Flood Tolerance[2/]	Salt Tolerance[3/]	Recovery After Harvest[4/]	Season of Use[5/]	Longevity[6/]	Grazing Preference[7/]	Stand Estab-lishment[8/]
Native Forbs/Legumes									
American licorice	Jun-Aug	Poor	Good	Poor	Poor	Sp, Su	Medium	Low	Medium
American vetch	May-Aug	Good	Poor	Poor	NR	NR	Medium	NR	Medium
Black-eyed susan	Jul-Sep	Good	Good	Poor	NR	NR	Short	NR	Rapid
Blanket flower	Jul-Aug	Good	Fair	Poor	NR	NR	Medium	NR	Medium
Blue vervain	Jul-Sep	NR	NR	NR	NR	NR	NR	Low	NR
Boneset	Jul-Sep	Good	Poor	NR	NR	Sp, Su	Medium	Low	Slow
Broadbeard beardtonge	May-Jun	Good	Poor	Poor	NR	Sp, Su	Short	NR	Slow
Butterfly milkweed	Jun-Aug	Good	Medium	Poor	Poor	Sp, Su	Medium	Low	Slow
Canada milkvetch	Jun-Aug	Fair	Good	Poor	NR	NR	Short	NR	Medium
Canada tick trefoil	Jul-Aug	NR	NR	NR	NR	NR	NR	NR	NR
Common milkweed	May-Aug	NR	NR	NR	NR	NR	NR	NR	Rapid
Compass plant	Jun-Sep	NR	NR	NR	NR	NR	NR	NR	NR
Coneflower									
grayhead	Jun-Sep	Good	Poor	Poor	Poor	Sp, Su	Medium	Medium	Medium
prairie (yellow)	Jun-Sep	Good	Fair	Poor	NR	NR	Medium	NR	Rapid
purple (E. angustifolia)	Jun-Jul	Good	Poor	Poor	NR	NR	Long	NR	Medium
Cudweed sagewort	Aug-Sep	Good	Poor	Poor	NR	NR	Long	NR	Medium
Culvers root	Jun-Aug	NR	NR	NR	NR	NR	NR	NR	NR
Cup plant	Jul-Sep	Poor	Fair	Poor	NR	NR	NR	NR	NR
Dotted gayfeather	Aug-Sep	Good	Poor	Poor	NR	NR	Long	NR	Slow
Dwarf indigo	Jun-Jul	Good	Poor	Poor	Poor	Su	Long	Medium	NR
False boneset	Jul-Aug	Good	NR	NR	NR	Su	NR	NR	NR
False gromwell	Jun-Jul	Good	NR	NR	NR	Sp, Su	Medium	NR	NR
False sunflower	Jul-Sep	NR	NR	NR	NR	NR	NR	NR	NR
Fragrant giant hyssop	Jul-Sep	NR	NR	NR	NR	NR	NR	NR	NR
Fuzzytongue penstemon	May-Jul	Good	NR	NR	NR	Sp, Su	Short	NR	NR
Geyer's aster	Aug-Sep	NR	NR	NR	NR	NR	NR		
Golden alexanders	Apr-Jul	NR	NR	NR	NR	NR	NR	NR	NR
Gray goldenrod	Jul-Sep	Fair	Poor	Poor	Good	Sp, Su	Short	Medium	Rapid
Groundplum milkvetch	May-Jun	Fair	Poor	Poor	NR	NR	NR	Medium	NR
Heath aster	Aug-Oct	NR	NR	NR	NR	NR	NR	Low	NR
Hoary vervain	Jun-Sep	NR	NR	NR	NR	NR	NR	Low	NR
Illinois bundleflower	Jul-Aug	Fair	Poor	Poor	Fair	Sp, Su	Long	High	Rapid
Illinois tick trefoil	Jul-Aug	NR	NR	NR	NR	NR	NR	NR	NR
Indian blanket	Jul-Aug	Fair	Poor	Poor	Poor	Sp	Medium	Low	Medium

Table 3. Species Characteristics (Continued)

Species	Bloom Period	Drought Tolerance[1/]	Flood Tolerance[2/]	Salt Tolerance[3/]	Recovery After Harvest[4/]	Season of Use[5/]	Longevity[6/]	Grazing Preference[7/]	Stand Estab-lishment[8/]
Indian breadroot	May-Jun	NR	NR	NR	NR	NR	NR	Low	NR
Ironweed	Jul-Oct	NR	NR	NR	NR	NR	NR	NR	NR
Joe-pye weed	Jul-Sep	NR	NR	NR	NR	NR	NR	NR	NR
Lewis flax	Jun-Jul	Good	Fair	Poor	NR	NR	Medium	NR	Rapid
Maximilian sunflower	Aug-Oct	Poor	Good	Poor	NR	NR	Long	NR	Medium
Meadow blazing star	Jul-Sep	Good	Poor	Poor	NR	NR	Long	NR	NR
New England aster	Sep-Oct	NR	NR	NR	NR	NR	NR	NR	NR
Plains coreopsis	Jun-Sep	Good	Good	Poor	NR	NR	Short	NR	Rapid
Prairie aster	Aug-Sep	Fair	NR	NR	NR	S	NR	NR	NR
Prairie cinquefoil	Jul-Sep	Poor	Fair	Poor	Poor	Sp, S	Short	Low	Slow
Prairie spiderwort	May-Jul	Fair	NR	NR	NR	Sp, S	NR	NR	NR
Purple prairie clover	Jul-Sep	Good	Fair	Fair	NR	NR	Medium	NR	Medium
Rocky Mountain bee plant	Jun-Aug	Good	Poor	Poor	NR	Su	NR	Low	NR
Rough blazing star	Aug-Oct	Fair	Poor	Poor	Poor	Su	Long	High	NR
Round-headed bush clover	Aug-Sep	Good	Poor	Poor	Poor	Su	Long	Low	Slow
Scarlet globemallow	Jun-Aug	Good	Poor	Poor	NR	Su	Long	Low	Medium
Shell-leaf penstemon	May-Jun	Good	Poor	Poor	NR	NR	Short	NR	Medium
Showy goldenrod	Jul-Sep	NR	NR	NR	NR	Su	NR	NR	NR
Showy partridgepea	Jul-Sep	NR	NR	NR	NR	NR	NR	NR	NR
Stiff goldenrod	Aug-Oct	Good	Poor	Poor	Fair	Sp, Su	Medium	Low	Medium
Stiff sunflower	Jul-Oct	Good	Good	Poor	NR	NR	Long	NR	Medium
Swamp milkweed	Jun-Sep	Poor	Good	Poor	Poor	Sp	Medium	Low	Slow
Tall meadow rue	Jun-Jul	NR	NR	NR	NR	NR	NR	NR	NR
Thickspike gayfeather	Jul-Sep	Fair	Fair	Poor	Poor	Su	Medium	Low	Medium
Water plantain	Jun-Jul	Poor	Good	Poor	Poor	Sp, Su	Medium	NR	Medium
Western yarrow	May-Oct	Good	Good	Fair	NR	NR	Long	NR	Medium
White prairie clover	Jul-Aug	Good	Fair	Fair	NR	NR	Medium	NR	Medium
Wild bergamot	Jul-Aug	Poor	Good	Poor	Poor	Sp	Medium	Medium	Medium
Introduced Legumes									
Alfalfa	NR	Good	Poor	Poor	Good	Sp, Su	Medium	High	Rapid
Birdsfoot trefoil	NR	Fair	Fair	Poor	Good	Sp, Su	Medium	High	Rapid
Cicer milkvetch	NR	Good	Fair	Fair	Good	Sp	Long	High	Medium
Clover									
alsike	NR	Poor	Good	Fair	Good	Sp, Su	Short	High	Medium
Ladino (white clover)	NR	Poor	Good	Fair	Fair	Sp, Su	Short	High	Medium
red clover	NR	Fair	Fair	Poor	Fair	Sp, Su	Short	High	Medium

Table 3. Species Characteristics (Continued)

Species	Bloom Period	Drought Tolerance[1/]	Flood Tolerance[2/]	Salt Tolerance[3/]	Recovery After Harvest[4/]	Season of Use[5/]	Longevity[6/]	Grazing Preference[7/]	Stand Estab-lishment[8/]
Introduced Legumes (cont.)									
strawberry clover	NR	Fair	Good	Good	Fair	Sp, Su	Long	High	Medium
Hairy vetch	NR	Fair	Fair	Poor	Fair	Su, F	Short	High	Rapid
Sainfoin	NR	Good	Poor	Poor	Fair	Sp, Su	Medium	High	Slow
Small burnet	NR	Good	Poor	Poor	NR	Su, F	Long	Medium	Slow
Sweetclover	NR	Good	Fair	Good	Poor	Sp, Su	Medium	Medium	Rapid
Native Shrubs									
Big sage	Aug-Oct	Good	Poor	Poor	NR	NR	Long	Low	Slow
Buffaloberry	May-Jun	Good	Poor	Good	NR	NR	Long	NR	Slow
Chokecherry	May-Jun	Fair	Fair	Poor	NR	NR	Long	NR	Slow
Currant	Apr-May	Good	Fair	Fair	NR	NR	Medium	NR	Slow
False indigo	NR	Poor	Good	Poor	NR	NR	Medium	NR	Slow
Fourwing saltbush	May-Jul	Good	Poor	Good	NR	NR	Long	NR	Slow
Fringed sage	Aug-Sep	Good	Poor	Medium	NR	NR	Short	Low	Rapid
Gardner saltbush	NR	Good	Poor	Good	NR	NR	Long	NR	Slow
Juneberry	Apr-Jun	Poor	Good	Poor	NR	NR	Long	NR	Slow
Leadplant	Jun-Aug	Good	Poor	Poor	NR	NR	Long	NR	Slow
Prairie rose	May-Aug	Good	Fair	Poor	NR	NR	Long	NR	Slow
Sand sage	Aug-Sep	Good	Poor	Medium	NR	NR	Long	Low	Slow
Silver sage	Aug-Sep	Good	Poor	Low	NR	NR	Long	Low	Medium
Western snowberry	Jun-Jul	Fair	Fair	Poor	NR	NR	Long	NR	Slow
Winterfat	Apr-Jun	Good	Poor	Poor	NR	NR	Long	NR	Slow

NR – Not Rated

[1/]Drought tolerance: Based on species being on an adapted site.
[2/]Flood tolerance: Good – 28-42 days; Fair – 14-28 days; Poor – less than 14 days. Creeping foxtail and reed canarygrass can tolerate up to 60 days.
[3/]Salt tolerance: Based on SAR (Sodium Adsorption Ratio) Values 1-5 poor; 6-10 fair; 11-14 good. No species available for 15+ values.
[4/]Recovery after Harvest: Based on adequate soil moisture.
[5/]Season of Use: Sp – spring; Su – summer; F – fall; W – winter.
[6/]Longevity: Short 1-4 years; Medium 5-10 years; Long – longer than 10 years with proper management.
[7/]Grazing Preference: Based on season of rapid growth. Palatability is relative, depending on quantity, quality, and availability of other species. Grazing preference shown is for cattle and will vary for other species of domestic livestock or wildlife.
[8/]Stand Establishment: Rapid – usually 1 growing season after planting; Medium – usually 1-2 growing seasons after planting; Slow – usually 2-3 years after planting.

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 53B

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	G		F		G	G	F			G	F		
Basin wildrye			F		F	F				F			
Beardless wildrye		F					G						
Canada wildrye			G		G	G	F	G		F	F	F	
Creeping foxtail						F	F				F		G
Crested wheatgrass	G	F	G	G	G	G		F	G	G		G	
Dahurian wildrye	G	F	G	F	G	G		F		G	F	F	
Green needlegrass	G	F	G	F	G	G				G	F		
Intermediate wheatgrass	G		F	F	G	G		F	F	G	F	F	
Meadow brome	G		F		G	G				G	G	F	
Quackgrass-Bluebunch h	G	F	G	F	G	G	G	F	F	G	G	F	
Reed canarygrass						F					F		G
Russian wildrye	G	F	G	F	G	F	F	F	F	G			
Siberian wheatgrass			F	G				G		F		G	
Slender wheatgrass	G	G	G	G	G	G	G	F	F	G	G	F	F
Smooth brome	G		F	G	G	G				G	G	F	
Tall wheatgrass	G	F	F		G	F	G			F	G		G
Western wheatgrass	G	G	G	G	G	G	G	F	F	G	G	F	F
Warm-season Grasses													
Big bluestem	F		F		G	G				F	G		
Blue grama	G	F	G	G	G	F		F	G	G		G	
Indiangrass					F	F					F		
Little bluestem	F		G	G	G	F		G	G	G	G	G	
Prairie cordgrass													G
Prairie sandreed			G	G	F			G	G	G		F	
Sand bluestem			G					G	G			F	
Sideoats grama	F		G	G	G	G		F	F	G		F	
Switchgrass	F		F		G	G	F			F	G		G
Legumes													
Alfalfa	G	F	G	F	G	G		F	F	G	G	F	
Alsike clover						F	F				F		G
American vetch	F		G	G	G	G		F		G	F	F	
Canada milkvetch	F		F	F	G	G		F		G	G		
Cicer milkvetch	F		G	F	G	G		F		G	F		
Hairy vetch		F	F	F	G	G				F	F		
Purple prairieclover	F		G	F	G	F		G	G	G		G	
Sainfoin			G	F	F			F		F		F	
Sweetclover	G	F	G	F	G	G	F	F	F	G	G	F	F
White clover	F				F	G					F		
White prairieclover	F		G	F	G	F		G	G	G		G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 53C

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		F		F	F		F			F		
Beardless wildrye		F											
Canada wildrye			F		F	G		G			F		
Creeping foxtail						F					F		G
Crested wheatgrass	G	F	G	G	G	G		F	F			F	
Green needlegrass	G	F	G	F	G	G		F	F		F	F	
Intermediate wheatgrass	G	F	G	F	G	G		G	F		F	F	
Meadow brome	G		G	F	G	G		G			G		F
Quackgrass-Bluebunch h	G	F	G	F	G	G		G	F		G	F	
Reed canarygrass						F					G		G
Russian wildrye	G	F	G	F	G	G		F	F			F	
Slender wheatgrass	G	F	G	F	G	G		F	F		G	F	
Smooth brome	G	F	G		G	G		F	F		G	F	
Tall wheatgrass	G	G	G		G	G		F			G		
Western wheatgrass	G	G	G	F	G	G		F	F		G	F	F
Warm-season Grasses													
Big bluestem	G		F	F	G	G		F			G		
Indiangrass	F		F		G	G		F			G		
Little bluestem	F		G	G	G	G		G	F		G	F	
Prairie sandreed			F	F	F			G	F			F	
Sand bluestem			F		F	F		G	F			F	
Sideoats grama	F		G	G	G	G		F	F			F	
Switchgrass	G		F		G	G		F			G		F
Legumes													
Alfalfa	G	F	G	F	G	G		F			F		
Alsike clover											F		
Bird's-foot trefoil	F		F		F	G					G		
Canada milkvetch	F		F		G	G		F			F		
Cicer milkvetch	F		G		G	G		G			F		
Purple prairieclover			G	G	G	F		G	G			G	
Sainfoin			F	F	F	F		F					
White prairieclover	F		G	F	G	F		G	G			G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 54

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		F		G	G	F			G			
Basin wildrye			F		F	F				F			
Beardless wildrye		F					G						
Canada wildrye			G		G	G	F	G		F	F	F	
Creeping foxtail							F						G
Crested wheatgrass	G	F	G	G	G	G		F	F	G	G	G	
Dahurian wildrye	G	F	G	F	G	G		F		G		F	
Green needlegrass	G		G	F	G	G				G	F		
Intermediate wheatgrass	F	F	F	F	G	G		F		G	F	F	
Meadow brome	F		F		G	G				F	F		
Quackgrass-Bluebunch h	G	F	G	F	G	G	G	F		G	F	F	
Reed canarygrass						F							G
Russian wildrye	G	F	G	F	G	G	F	F		G	F		
Siberian wheatgrass	F		G	G	F			G	F	F		G	
Slender wheatgrass	G	G	G	G	G	G	G	F	F	G	G	F	F
Smooth brome	F		F	F	G	G				G	F	F	
Tall wheatgrass	F	F	F		F	G	G			F	G		G
Western wheatgrass	G	G	G	G	G	G	G	F	F	G	G	F	G
Warm-season Grasses													
Big bluestem			F		G	G				F	G		
Blue grama	G	F	G	G	G	F		F	F	G		G	
Little bluestem	F		G	G	G	F		G	F	G	G	F	
Prairie cordgrass													G
Prairie sandreed			G	G	F			G	F	G		F	
Sand bluestem			G	F				G	F	F		F	
Sideoats grama	F		G	G	G	G		F	F	G		F	
Switchgrass	F		F		G	G	F			F	G		G
Legumes													
Alfalfa	G	F	G	F	G	G		F		G	G	F	
Alsike clover							F						F
American vetch	F		G	F	G	G		F		G	F	F	
Canada milkvetch	F		F	F	G	G		F		G	F		
Cicer milkvetch	F		G		G	G		F		G	F		
Hairy vetch		F	F		F	F				G	F		
Purple prairieclover	F		G	F	G	F		F	F	G		G	
Sainfoin			G	F	F	F		F		F		F	
Sweetclover	G	F	G	F	G	G	F	F	F	G	G	F	F
White clover	F				F	G				F			
White prairieclover	F		G	F	G	F		F	F			G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 55B

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		F		F	F	F	F		F	F		
Beardless wildrye		F					G						
Canada wildrye			F		F	G	F	G		F	F		
Creeping foxtail						F	F				F		G
Crested wheatgrass	G	F	G	G	G	G		F	F	G		F	
Dahurian wildrye	G	F	F	F	G	G		F			F	F	F
Green needlegrass	G	F	G	F	G	G		F	F	G	F	F	
Intermediate wheatgrass	G	F	G	F	G	G		G	F	G	F	F	
Meadow brome	G		G	F	G	G		G		G	G		F
Quackgrass-Bluebunch h	G	F	G	G	G	G	G	G	F	G	G	F	
Reed canarygrass						F					G		G
Russian wildrye	G	F	G	F	G	G	F	F	F	G		F	
Slender wheatgrass	G	F	G	F	G	G	G	F	F	G	G	F	
Smooth brome	G	F	G		G	G		F	F	G	G	F	
Tall wheatgrass	G	G	G		G	G	G	F		G	G		
Western wheatgrass	G	G	G	F	G	G	G	F	F	G	G	F	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		F	F	G	G		F		F	G		
Blue grama	G	F	G	G	G	F		F	F	G		F	
Indiangrass	F		F		G	G		F		F	G		
Little bluestem	F		G	G	G	G		G	F	G	G	F	
Prairie cordgrass							F						G
Prairie sandreed			F	F	F			G	F	F		F	
Sand bluestem			F		F	F		G	F	F		F	
Sideoats grama	F		G	G	G	G		F	F	G		F	
Switchgrass	G		F		G	G		F		F	G		F
Legumes													
Alfalfa	G	F	G	F	G	G		F		G	F		
Alsike clover							F				F		
American vetch	F		F	G	G	G		F		F		F	
Bird's-foot trefoil	F		F		F	G	F			F	G		
Canada milkvetch	F		F		G	G		F		F	F		
Cicer milkvetch	F		G		G	G		G		G	F		
Hairy vetch	F	F	F	F	G	G					F		
Purple prairieclover			G	G	G	F		G	G	G		G	
Red clover	G		F		G	G				F			
Sainfoin			F	F	F	F		F		F			
Strawberry clover					F		G						F
Sweetclover	G	F	G	F	G	G	F	F	F	G	F	F	
White clover	G				G	G					F		
White prairieclover	F		G	F	G	F		G	G	G		G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 55C

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		F		F	F	F	F			F		
Beardless wildrye		F					G						
Canada wildrye			F		F	G	F	G			F		
Creeping foxtail						F	F				F		G
Crested wheatgrass	G	F	G	G	G	G		F	F			F	
Green needlegrass	G	F	G	F	G	G		F	F		F	F	
Intermediate wheatgrass	G	F	G	F	G	G		G	F		F	F	
Meadow brome	G		G	F	G	G		G			G		F
Quackgrass-Bluebunch h	G	F	G	G	G	G	G	G	F		G	F	
Reed canarygrass						F					G		G
Russian wildrye	G	F	G	F	G	G	F	F	F			F	
Slender wheatgrass	G	F	G	F	G	G	G	F	F		G	F	
Smooth brome	G	F	G		G	G		F	F		G	F	
Tall fescue						G					G		G
Tall wheatgrass	G	G	G		G	G	G	F			G		
Timothy				F	F	G					F		
Western wheatgrass	G	G	G	F	G	G	G	F	F		G	F	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		F	F	G	G		F			G		
Blue grama	G	F	G	G	G	F		F			G		
Indiangrass	F		F		G	G		F			G		
Little bluestem	F		G	G	G	G		G	F		G	F	
Prairie sandreed			F	F	F			G	F			F	
Sand bluestem			F		F	F		G	F			F	
Sideoats grama	F		G	G	G	G		F	F			F	
Switchgrass	G		F		G	G		F			G		F
Legumes													
Alfalfa	G	F	G	F	G	G		F			F		
Alsike clover							F				F		
Bird's-foot trefoil	F		F		F	G	F				G		
Canada milkvetch	F		F		G	G		F			F		
Cicer milkvetch	F		G		G	G		G			F		
Purple prairieclover			G	G	G	F		G	G			G	
Red clover	G		F		G	G							
Sainfoin			F	F	F	F		F					
Sweetclover	G	F	G	F	G	G	F	F	F		F	F	
White prairieclover	F		G	F	G	F		G	G			G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 56

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		F		F	F	F	F			F		
Beardless wildrye		F					G						
Canada wildrye			F		F	G	F	G			F		
Creeping foxtail						F	F				F		G
Crested wheatgrass	G	F	G	G	G	G		F	F			F	
Dahurian wildrye	G	F	F	F	G	G		F			F	F	F
Green needlegrass	G	F	G	F	G	G		F	F		F	F	
Intermediate wheatgrass	G	F	G	F	G	G		G	F		F	F	
Meadow brome	G		G	F	G	G		G			G		F
Orchardgrass	F		G	F	G	G					G	F	
Quackgrass-Bluebunch h	G	F	G	G	G	G	G	G	F		G	F	
Reed canarygrass						F					G		G
Russian wildrye	G	F	G	F	G	G	F	F	F			F	
Slender wheatgrass	G	F	G	F	G	G	G	F	F		G	F	
Smooth brome	G	F	G		G	G		F	F		G	F	
Tall fescue						G					G		G
Tall wheatgrass	G	G	G		G	G	G	F			G		
Timothy				F	F	G					F		
Western wheatgrass	G	G	G	F	G	G	G	F	F		G	F	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		F	F	G	G		F			G		
Blue grama	G	F	G	G	G	F		F	F			F	
Indiangrass	F		F		G	G		F			G		
Little bluestem	F		G	G	G	G		G	F		G	F	
Prairie cordgrass							F						G
Prairie sandreed			F	F	F			G	F			F	
Sand bluestem			F		F	F		G	F			F	
Sideoats grama	F		G	G	G	G		F	F			F	
Switchgrass	G		F		G	G		F			G		F
Legumes													
Alfalfa	G	F	G	F	G	G		F			F		
Alsike clover							F				F		
American vetch	F		F	G	G	G		F				F	
Bird's-foot trefoil	F		F		F	G	F				G		
Canada milkvetch	F		F		G	G		F			F		
Cicer milkvetch	F		G		G	G		G			F		
Hairy vetch	F	F	F	F	G	G					F		
Purple prairieclover			G	G	G	F		G	G			G	
Red clover	G		F		G	G							
Sweetclover	G	F	G	F	G	G	F	F	F		G		F
White clover	G				G	G					F		
White prairieclover	F		G	F	G	F		G	G			G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 58D

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		G	F	G	G	F	F				F	
Basin wildrye			G		G	G	F					F	
Beardless wildrye		F					G						
Creeping foxtail													G
Crested wheatgrass	G	F	G	G	G	G		G				G	
Green needlegrass	G	F	G	F	G	G						F	
Intermediate wheatgrass	G	F	F	F	G	G	F	F				F	
Meadow brome	F				F	F							
Nuttall's alkaligrass							G						
Quackgrass-Bluebunch h		F	F	F			G	F					
Reed canarygrass													G
Russian wildrye	G	F	G	G	G		F					G	
Slender wheatgrass		F					G						
Smooth brome	F	F	F		F	F							
Tall wheatgrass		G	F		F		G						F
Thickspike wheatgrass	F		G	G	G	F	F	F				G	
Western wheatgrass	G	G	G	G	G	G	G	F				G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	F			F	F	F		F					
Indiangrass				F									
Little bluestem	F		G	G	G	G		G				G	
Prairie sandreed			F	F	F			G				F	
Sand bluestem			F		F			G				F	
Sideoats grama	G		G	G	G	F		F				G	
Switchgrass	F				F	F		F					F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G				G	
Alsike clover							F						F
Canada milkvetch	F				F	F							
Cicer milkvetch	G		G	G	G	G	F	G				G	
Purple prairieclover	F		G	F	F	F		F				G	
Sainfoin	F		F	F	F	F						F	
White prairieclover	F		G	F	F	F		F				G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 60A

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		G	F	G	G	F	F				F	
Basin wildrye			G		G	G	F					F	
Beardless wildrye		F					G						
Creeping foxtail													G
Crested wheatgrass	G	F	G	G	G	G		G				G	
Green needlegrass	G	F	G	F	G	G						F	
Intermediate wheatgrass	G	F	F	F	G	G	F	F				F	
Meadow brome	F				F	F							
Nuttall's alkaligrass							G						
Quackgrass-Bluebunch h		F	F	F			G	F					
Reed canarygrass													G
Russian wildrye	G	F	G	G	G		F					G	
Slender wheatgrass		F					G						
Smooth brome	F	F	F		F	F							
Tall wheatgrass		G	F		F		G						F
Thickspike wheatgrass	F		G	G	G	F	F	F				G	
Western wheatgrass	G	G	G	G	G	G	G	F				G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	F			F		F		F					
Little bluestem	F		G	G	G	G		G				G	
Prairie sandreed			F	F	F			G				F	
Sand bluestem			F		F			G				F	
Sand lovegrass			F					F					
Sideoats grama	G		G	G	G	F		F				G	
Switchgrass	F				F	F		F					F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G				G	
Alsike clover					F		F						F
Canada milkvetch	F				F	F							
Cicer milkvetch	G		G	G	G	G	F	G				G	
Purple prairieclover	F		G	F	F	F		F				G	
Sainfoin	F		F	F	F	F						F	
White prairieclover	F		G	F	F	F		F				G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 61

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		G	F	G	G	F	F				F	
Basin wildrye			G		G	G						F	
Beardless wildrye		F					G						
Canada wildrye							F						
Creeping foxtail							F						G
Crested wheatgrass	G	F	G	G	G	G		G				G	
Green needlegrass	G	F	G	F	G	G						F	
Intermediate wheatgrass	G	F	F	F	G	G		F				F	
Meadow brome	F				G	G							
Quackgrass-Bluebunch h		F	F	F			G	F					
Reed canarygrass													G
Russian wildrye	G	F	G	G	G		F					G	
Slender wheatgrass		F					G						
Smooth brome	F		F		G	G							
Tall wheatgrass		G	F		F		G						F
Thickspike wheatgrass	F		G	G	G	F		F				G	
Western wheatgrass	G	G	G	G	G	G	G	F				G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	F			G	F	F		F					
Little bluestem	F		G	G	G	G		G				G	
Prairie sandreed			F	F	F			G				F	
Sand bluestem			F		F			G				F	
Sand lovegrass			F					F					
Sideoats grama	G		G	G	G	F		F				G	
Switchgrass	F				F	F		F					F
Legumes													
Alfalfa	G	F	G	G	G	G		G				G	
Alsike clover					F								F
Canada milkvetch	F				F	F							
Cicer milkvetch	G		G	G	G	G		G				G	
Purple prairieclover	F		G	F	F	F		F				G	
Sainfoin			F	F	F	F						F	
White prairieclover	F		G	F	F	F		F				G	
Forbs													
Small burnet	G		F		G								F

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 62

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Creeping foxtail													G
Crested wheatgrass	G		G	G	F			F				F	
Green needlegrass	G		G	F	G			F				F	
Intermediate wheatgrass	G		F	F	F			F				F	
Meadow brome	F		F		F								
Mountain brome	G		G		G								
Quackgrass-Bluebunch h				F									
Reed canarygrass													G
Smooth brome	G		F		G								
Tall wheatgrass	F				F								
Timothy	G		F		G								
Western wheatgrass	G		G	G	G			F				F	F
Warm-season Grasses													
Big bluestem	F			F	F								
Little bluestem	F		F	G	F								
Sideoats grama			F	G									
Switchgrass													F
Legumes													
Alsike clover	G		F		G								G
Canada milkvetch	G		G		G								
Cicer milkvetch	G		G	G	G			F				F	F
Illinois bundleflower	G		F		G								
Purple prairieclover	G		G	F	G								
Red clover	G		F		G								G
Sainfoin	G		G	F	G			F				F	F
White prairieclover	G		G	F	G			G				G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 63A

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	G		G		G	G	F	F		F	G		
Beardless wildrye		F					G						
Canada wildrye			F		F	G	F	G		F	F		
Creeping foxtail						F	F				F		G
Crested wheatgrass	G	F	G	G	G	G		G	F	G		F	
Green needlegrass	G	F	G	F	G	G		F	F	G	F	F	
Intermediate wheatgrass	G	F	G	F	G	G		F	F	G	F	F	
Meadow brome	F		F	F	G	G		F		G	G		F
Quackgrass-Bluebunch h	G			F	G	G	G		F	G	G	F	
Reed canarygrass						F					F		G
Russian wildrye	G	F	G	F	G	G	F	F	F	G		F	
Slender wheatgrass	G	F	G	F	G	G	G	F	F	G	G	F	
Smooth brome	F	F	F		G	G		F	F	G	G	F	
Tall wheatgrass	G	G	G		G	G	G	F		G	G		
Western wheatgrass	G	G	G	F	G	G	G	F	F	G	G	F	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		F	F	G	G		F		F	G		
Indiangrass	F		F		G	G		F		F	G		
Little bluestem	G		G	G	G	G		G	F	G	G	F	
Prairie sandreed			F	F	F			G	F	F		F	
Sand bluestem			F		F	F		G	F	F		F	
Sideoats grama	G		G	G	G	G		F	F	G		F	
Switchgrass	G		F		G	G		F		F	G		F
Legumes													
Alfalfa	G	F	G	F	G	G		F		G	F		
Alsike clover							F				F		
Bird's-foot trefoil	F		F		F	F	F			F	G		
Canada milkvetch	F		F		F	G		F		F	F		
Cicer milkvetch	F		G	G	G	G		G		G	G		
Purple prairieclover			G	G	F	F		F	G	G	F	G	
Sainfoin			F	F	F	F		F		F	F		
Sweetclover	G	F	G	F	G	G	F	F	F	G	F	F	
White prairieclover	F		G	F	F	F		G	G	G	F	G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 63B

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Beardless wildrye		F					G						
Creeping foxtail							F				F		G
Crested wheatgrass	G	F	G	G	G			F				G	
Green needlegrass	G	F	G	F	G	G					F	G	
Intermediate wheatgrass	G	F	G	F	G	G	F	F			G	F	
Meadow brome	G		G	F	G	G					G	F	
Nuttall's alkaligrass							G						
Orchardgrass	F		F		G	G					G		
Quackgrass-Bluebunch h		F		F			G						
Reed canarygrass							F				G		G
Russian wildrye	G	F	G	F	G		F					G	
Slender wheatgrass		F					G						
Smooth brome	G	F	G	F	G	G		F			G	F	
Tall wheatgrass	F	G	F		G	G	G				G		F
Western wheatgrass	G	G	G	G	G	G	G	F			G	G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		G	G	G	G		G			G	F	
Indiangrass	G		F	F	G	G		G			G		
Little bluestem	G		G	G	G	G		G			G	G	
Prairie sandreed			F	F	F	F		G					
Sand bluestem			F		F	F		G					
Sand lovegrass								F					
Sideoats grama	G		G	G	F	F		F				G	
Switchgrass	G		F	F	G	G	F	G			G		F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G			F	G	
Alsike clover							F				G		F
Bird's-foot trefoil	F				F	G	F				G		
Canada milkvetch	F				F	G					F		
Cicer milkvetch	G		G	G	G	G	F	F			F	G	
Illinois bundleflower	F				F	G		F			F		
Purple prairieclover	F		G	G	F	F		F			F	G	
Red clover	F		F		F	G					G		
Sainfoin			G	F	F			F				F	
White prairieclover	F		F	F	F	F					F	F	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 64

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Altai wildrye	F		G	F	G	G	F	F			G	F	
Basin wildrye			G		G	G	F				G	F	
Beardless wildrye		F					G						
Creeping foxtail											F		G
Crested wheatgrass	G	F	G	G	G	G		G			G	G	
Green needlegrass	G	F	G	F	G	G					F	F	
Intermediate wheatgrass	G	F	F	F	G	G	F	F			G	F	
Meadow brome	F				F	F					G		
Nuttall's alkaligrass							G						
Quackgrass-Bluebunch h		F	F	F			G	F			F		
Reed canarygrass													G
Russian wildrye	G	F	G	G	G		F				G	G	
Slender wheatgrass		F					G						
Smooth brome	F	F	F		F	F					G		
Tall wheatgrass		G	F		F		G				G		F
Thickspike wheatgrass	F		G	G	G	F	F	F			F	G	
Western wheatgrass	G	G	G	G	G	G	G	F			G	G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	F			F	F	F		F			G		
Indiangrass				F									
Little bluestem	F		G	G	G	G		G			G	G	
Prairie sandreed			F	F	F			G				F	
Sand bluestem			F		F			G				F	
Sand lovegrass			F					F					
Sideoats grama	G		G	G	G	F		F				G	
Switchgrass	F				F	F		F			G		F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G			F	G	
Alsike clover							F				F		F
Bird's-foot trefoil											F		
Canada milkvetch	F				F	F					F		
Cicer milkvetch	G		G	G	G	G	F	G			G	G	
Purple prairieclover	F		G	F	F	F		F			F	G	
Red clover											F		
Sainfoin	F		F	F	F	F					F	F	
White prairieclover	F		G	F	F	F		F			F	G	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 65

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Creeping foxtail											F		G
Crested wheatgrass			G		G			G					
Green needlegrass			G		G						F		
Intermediate wheatgrass			G		G			F			G		
Meadow brome			F		G			NS			G		
Orchardgrass			NS		F			NS			F		
Reed canarygrass											F		G
Russian wildrye			G		G								
Slender wheatgrass					NS								
Smooth brome			F		G			F			G		
Tall wheatgrass					F						G		F
Western wheatgrass			G		G			F			G		F
Warm-season Grasses													
Big bluestem			G		G			F			G		
Indiangrass			F		G			F			G		
Little bluestem			G		G			G			G		
Prairie sandreed			G		F			G					
Sand bluestem			G		F			G					
Sand lovegrass			F					F					
Sideoats grama			G		F			F					
Switchgrass			F		G			F			G		F
Legumes													
Alfalfa			G		G			G			F		
Alsike clover											G		F
Bird's-foot trefoil			NS		F			NS			G		
Canada milkvetch					F						F		
Cicer milkvetch			G		G			G			G		
Purple prairieclover			G		F			F			F		
Red clover			NS		F			NS			G		
Sainfoin			F		F						F		
White prairieclover			F		F						F		

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 66

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Beardless wildrye		F					G						
Creeping foxtail							F				F		G
Crested wheatgrass	G	F	G	G	G			F				G	
Green needlegrass	G	F	G	F	G	G					F	G	
Intermediate wheatgrass	G	F	G	F	G	G	F	F			G	F	
Meadow brome	G		G	F	G	G					G	F	
Nuttall's alkaligrass							G						
Orchardgrass	F		F		G	G					G		
Quackgrass-Bluebunch h		F		F			G						
Reed canarygrass							F				G		G
Russian wildrye	G	F	G	F	G		F					G	
Slender wheatgrass		F					G						
Smooth brome	G	F	G	F	G	G		F			G	F	
Tall wheatgrass	F	G	F		G	G	G				G		F
Western wheatgrass	G	G	G	G	G	G	G	F			G	G	F
Warm-season Grasses													
Big bluestem	G		G	G	G	G		G			G	F	
Indiangrass	G		F	F	G	G		G			G		
Little bluestem	G		G	G	G	G		G			G	G	
Prairie sandreed			F	F	F	F		G					
Sand bluestem			F		F	F		G					
Sand lovegrass								F					
Sideoats grama	G		G	G	F	F		F				G	
Switchgrass	G		F	F	G	G	F	G			G		F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G			F	G	
Alsike clover							F				G		F
Bird's-foot trefoil	F				F	G	F				G		
Canada milkvetch	F				F	G					F		
Cicer milkvetch	G		G	G	G	G	F	F			F	G	
Illinois bundleflower	F				F	G		F			F		
Purple prairieclover	F		G	G	F	F		F			F	G	
Red clover	F		F		F	G					G		
Sainfoin			G		F			F				F	
White prairieclover	F		F	F	F	F					F	F	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 102A

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Beardless wildrye		F					G						
Canada wildrye	F				F	F					F		
Creeping foxtail							F				F		G
Crested wheatgrass		F							F				
Green needlegrass	G	F	G	F	G	G			F		F	G	
Intermediate wheatgrass	G	F	G	G	G	G	F	F	F	G	G	F	
Meadow brome	G		G	F	G	G					G	F	
Orchardgrass	F		G	F	G	G					G	F	
Quackgrass-Bluebunch h		F		F			G		F				
Reed canarygrass							F				G		G
Russian wildrye		F							F				
Slender wheatgrass		F					G		F				
Smooth brome	G	F	G	F	G	G		F	F	G	G	F	
Tall fescue						G					G		G
Tall wheatgrass	F	G	F		G	G	G			F	G		F
Timothy				F	F	G					F		
Virginia wildrye	F				F	F					F		
Western wheatgrass	F	G	G	G	F	F	G	F	F	G	F	G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		G	G	G	G		G		G	G	F	
Indiangrass	F		F	F	G	G		G		G	G		
Little bluestem	F		G	G	F	F		G	F	F	F	G	
Prairie cordgrass							F						G
Prairie sandreed			F	F	F	F		G	F				
Sand bluestem			F		F	F		G	F				
Sand lovegrass								F					
Sideoats grama	F		G	G	F	F		F	F	G		G	
Switchgrass	G		F	F	G	G	F	G		G	G		F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G		G	F	G	
Alsike clover							F				G		F
Bird's-foot trefoil	F		F	F	G	G	F				G		
Canada milkvetch	F				F	G					F		
Cicer milkvetch	G		G	G	G	G	F	F		G	F	G	
Illinois bundleflower	F				F	G				F	F		
Purple prairieclover	F		G	G	F	F		F	G	G	F	G	
Red clover	F		F	F	F	G					G		
Sweetclover		F							F				
White prairieclover	F		F	F	F	F			G	G	F	F	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 102B

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Beardless wildrye		F					G						
Canada wildrye	F				F	F					F		
Creeping foxtail							F				F		G
Crested wheatgrass		F							F				
Green needlegrass	G	F	G	F	G	G			F		F	G	
Intermediate wheatgrass	G	F	G	F	G	G	F	F	F	G	G	F	
Meadow brome	G		G	F	G	G					G	F	
Orchardgrass	F		G	F	G	G					G	F	
Quackgrass-Bluebunch h		F		F			G		F				
Reed canarygrass							F				G		G
Russian wildrye		F							F				
Slender wheatgrass		F					G		F				
Smooth brome	G	F	G	F	G	G		F	F	G	G	F	
Tall fescue						G					G		G
Tall wheatgrass	F	G	F		G	G	G			F	G		F
Timothy				F	F	G					F		
Virginia wildrye	F				F	F					F		
Western wheatgrass	F	G	G	G	F	F	G	F	F	G	F	G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		G	G	G	G		G		G	G	F	
Indiangrass	F		F	F	G	G		G		G	G		
Little bluestem	F		G	G	F	F		G	F	F	F	G	
Prairie cordgrass							F						G
Prairie sandreed			F	F	F	F		G	F				
Sand bluestem			F		F	F		G	F				
Sand lovegrass								F					
Sideoats grama	F		G	G	F	F		F	F	G		G	
Switchgrass	G		F	F	G	G	F	G		G	G		F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G		G	F	G	
Alsike clover							F				G		F
Bird's-foot trefoil	F		F	F	G	G	F				G		
Canada milkvetch	F				F	G					F		
Cicer milkvetch	G		G	G	G	G	F	F		G	F	G	
Illinois bundleflower	F				F	G				F	F		
Purple prairieclover	F		G	G	F	F		F	G	G	F	G	
Red clover	F		F	F	F	G					G		
Sweetclover		F											
White prairieclover	F		F	F	F	F			G	G	F	F	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 4A
SPECIES ADAPTABILITY BY FORAGE SUITABILITY GROUPS
MLRA 102C

Group/Species	Clayey Subsoil	Clay pan	Droughty Loam	Limy Upland	Loam	Over flow	Saline	Sand	Shallow	Steep Loam	Subirri gated	Very Droughty Loam	Wet
Cool-season Grasses													
Beardless wildrye		F					G						
Canada wildrye	F				F	F					F		
Creeping foxtail							F				F		G
Crested wheatgrass		F											
Green needlegrass	G	F	G	F	G	G						G	
Intermediate wheatgrass	G	F	G	F	G	G	F	F		G	G	F	
Meadow brome	G		G	F	G	G					G	F	
Orchardgrass	F		G	F	G	G					G	F	
Quackgrass-Bluebunch h		F		F			G						
Reed canarygrass							F				G		G
Russian wildrye		F											
Slender wheatgrass		F					G						
Smooth brome	G	F	G	F	G	G		F		G	G	F	
Tall fescue						G					G		G
Tall wheatgrass	F	G	F		G	G	G			F	G		F
Timothy				F	F	G					F		
Virginia wildrye	F				F	F					F		
Western wheatgrass	F	G	G	G	F	F	G	F		G	F	G	F
Warm-season Grasses													
Alkali sacaton							F						
Big bluestem	G		G	G	G	G		G		G	G	F	
Indiangrass	F		F	F	G	G		G		G	G		
Little bluestem	F		G	G	F	F		G		G	F	G	
Prairie cordgrass							F						G
Prairie sandreed			F	F	F			G					
Sand bluestem			F		F	F		G					
Sand lovegrass								F					
Sideoats grama	F		G	G	F	F		F		G		G	
Switchgrass	G		F	F	G	G	F	G		G	G		F
Legumes													
Alfalfa	G	F	G	G	G	G	F	G		F	F	G	
Alsike clover							F				G		F
Bird's-foot trefoil	F		F	F	G	G	F				G		
Canada milkvetch	F				F	G					F		
Cicer milkvetch	G		G	G	G	G	F	F		F	F	G	
Purple prairieclover	F		G	G	F	F		F		F	F	G	
Red clover	F			F	F	G				G	G		
White prairieclover	F		F	F	F	F				F	F	F	

G – Good adaptation for forage production on this group of soils in this MLRA
F – Fair adaptation but will not produce at its highest potential
Note - If no species are rated for a FSG soil group the group does not occur in this MLRA

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 53B

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group	SD name	CD 3/	Cp	Cy	LSb	Ly	LyOv	Sa	Sb	SL 2/	SM 2/	SwG	SwLy	Sy	SyCp	TCp	TLy	TSa	VSw	WL 2/	WM 2/
Grasses																					
Alkali sacaton										20						10					
American sloughgras		5									15									15	15
Big bluestem				20	40	20	40	10	50				20	20	20		20	10			
Blue grama			25	10	5	10	5	5				25	10	15	15	30	10	5	25		
Bluejoint reedgrass											20									20	20
Buffalograss		5	5	5		5										5					
Canada wildrye					5		10	5	5					5	5			5			
Green needlegrass		5	30	30	20	30	15		5			5	20	10	10		20		5		
Indiangrass				15	20	15	15	15	25					10	10			15			
Little bluestem			10	15	40	15	10	20	15			10	30	15	15		30	20	10		
Needleandthread			10	20		20	5	20				35	15	20	20	10	15	20	35		
Nuttall's alkaligrass		5								35						10					
Porcupinegrass			10	10	10	10	10	10	5			5	20	5	5		20	10	5		
Prairie cordgrass									5	25	50									50	50
Prairie dropseed				5		5		5					5	5	5		5	5			
Prairie sandreed			5	5		5		30					10	25	25		10	30			
Sand bluestem								30						5	5			30			
Sideoats grama			10	15	20	15	10	5				10	20	10	10	10	20	5	10		
Slender wheatgrass		5		15	5	15	5					5	10	10	10		10		5		
Slough sedge											50									50	50
Switchgrass				15	20	15	20	20	30	20				10	10			20			
Western wheatgrass		100	40	40	20	40	20	10	10	80		30	25	25	25	60	25	10	30		
Whitetop											50									50	50
Forbs 1/																					
American vetch				5		5	5		5				5	5	5		5				
Blacksamson echinac			5	5		5		5				5	5	5	5		5	5	5		
Canada milkvetch				5		5	5														
Cudweed sagewort			5	5		5	5					5	5	5	5	5	5		5		
Dotted gayfeather			5	5		5		5				5	5	5	5		5	5	5		
False boneset				5		5							5	5	5		5				
Illinois bundleflower				5		5	5	5				5	5	5	5		5	5	5		
Maximilian sunflower			5	5	5	5	5		5												
Plains coreopsis		5									5									5	5
Prairie coneflower			5	5		5	5	5				5	5	5	5		5	5	5		
Purple prairieclover			5	5		5	5	5				5	5	5	5		5	5	5		
Scarlet globemallow			5	5		5						5	5	5	5	5	5		5		
Stiff sunflower			5	5	5	5	5	5	5				5	5	5		5	5			
Western yarrow			5	5	5	5	5		5			5	5	5	5	5	5		5		
White prairieclover			5	5		5	5	5				5	5	5	5		5	5	5		

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 53B

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group	SD name	CD 3/	Cp	Cy	LSb	Ly	LyOv	Sa	Sb	SL 2/	SM 2/	SwG	SwLy	Sy	SyCp	TCp	TLy	TSa	VSw	WL 2/	WM 2/
Shrubs 1/																					
Fringed sagewort			5	5		5		5				5	5	5	5	5	5	5	5		
Leadplant				5		5	5	5				5	5	5	5		5	5	5		
Prairie rose			5	5	5	5	5	5	5			5	5	5	5		5	5	5		
Western snowberry				5	5	5	5		5				5	5	5		5				

1/Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/On these sites a minimum of two species must be planted.
3/A single species is allowable on this site.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 53C

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group	SD name	CD[3/]	COv	Cp	Cy	DC[2/]	LOv	LSb	Ly	Sb	Sa	SL[2/]	SM[2/]	SSb	Sw	SwC	SwG	Sy	TCp	TU	VSw	WL[2/]	WM[2/]
	Grasses																						
	Alkali sacaton											30							20				
	American sloughgras												10									10	10
	Big bluestem		40		20		40	40	20	50	20			40	25	25		20		25			
	Blue grama		10	25	10		10	10	10		20			10	25	25	25	20	40	25	25		
	Canada wildrye		10				10																
	Green needlegrass		25	40	50	40	25	25	50					25	25	25	5		10	25			
	Indiangrass		20		20		20	20	20	25	20			20				20					
	Little bluestem		20	20	30		20	50	30	25	30			50	40	40	10	30		40	25		
	Needleandthread			20	20				20		20				20	20	35	20		20	30		
	Nuttall's alkaligrass											30							20				
	Porcupinegrass														10	10	5			10			
	Prairie cordgrass												60									60	60
	Prairie dropseed										10				10	10		10		10			
	Prairie sandreed			20	10				10		30				10	10		30		10			
	Sand bluestem										30							30					
	Sideoats grama		20	20	25	20	20	20	25		20			20	30	30	10	20	20	30	25		
	Slender wheatgrass		10	5	10		10	10	10	5	5			10	10	10	5	5		10	5		
	Slough sedge												60									60	60
	Switchgrass		20		20		20	20	20	25	20	20		20	10	10		20		10			
	Western wheatgrass	100	20	40	40	70	20	20	40	25	20	80	10	20	30	30	30	20	60	30	40	10	10
	Whitetop												50									50	50
1/	**Forbs**																						
	Blacksamson echinac			5	5				5		5				5	5	5	5		5	5		
	Canada milkvetch			5	5				5		5							5					
	Cudweed sagewort																5						
	Dotted gayfeather			5	5				5		5				5	5	5	5		5	5		
	Illinois bundleflower			5	5				5		5				5	5	5	5		5	5		
	Maximilian sunflower		5	5	5		5	5	5	5	5			5				5					
	Plains coreopsis	5											5									5	5
	Prairie coneflower			5	5				5		5						5	5					
	Purple prairieclover			5	5				5		5				5	5	5	5		5	5		
	Scarlet globemallow																5						
	Stiff sunflower		5	5	5		5	5	5	5	5			5				5					
	Western yarrow		5	5	5		5	5	5	5	5			5	5	5	5	5		5	5		
	White prairieclover			5	5				5		5				5	5	5	5		5	5		
1/	**Shrubs**																						
	Fringed sagewort																5						
	Leadplant				5				5		5				5	5	5	5		5	5		
	Prairie rose																5						

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 53C

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group	SD name	CD[3/]	COv	Cp	Cy	DC[2/]	LOv	LSb	Ly	Sb	Sa	SL[2/]	SM[2/]	SSb	Sw	SwC	SwG	Sy	TCp	TU	VSw	WL[2/]	WM[2/]
1/	**Shrubs**																						
Western snowberry					5				5		5							5					

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ On these sites a minimum of two species must be planted.
3/ A single species is allowable on this site.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 54

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group SD name	CD[3/]	Cp	Cy	LiSa	Ly	LyOv	LyT	Sa	Sb	SL	SwCy	SwLy	SwSy	Sy	SyCp	SyT	TCp	TLy	TSa	VSw	WL[2/]	WM[2/]
Grasses																						
Alkali sacaton	10									10												
American sloughgrass	5																				20	20
Big bluestem			15	5	15	45	15		50			10	5	30	30	20		10				
Blue grama		25	10	10	10	5	10	5			15	10	10	10	10	5	35	10	5	25		
Bluejoint reedgrass																					20	30
Buffalograss		5	5		5						5						5					
Canada wildrye						5		5	5					5	5	10			5			
Fowl bluegrass									5	5												10
Green needlegrass		15	35	5	35	25	40		10		20	15	5	5	5	10	5	15				
Indiangrass						20		10	10					10	10	10			10			
Little bluestem			5	35	5	5	10	20	10	5	15	25	35	10	10	10		25	20	25		
Needleandthread		25	10	15	10	5	10	20			5	15	15	20	20	20	20	15	20	35		
Nuttall's alkaligrass	10									30												
Porcupinegrass			10	10	10	10	15	5	5		5	25	10	5	5	5		25	5			
Prairie cordgrass	15								5	25											50	60
Prairie dropseed		5				5	5				5	5						5				
Prairie junegrass		5	5	5	5		5				5	5	5	5	5	5	5	5		5		
Prairie sandreed		5		35				35				5	35	30	30	30		5	35			
Sand bluestem				30				40					30	30	30	30			40			
Sand dropseed		5		5				5					5	5	5	5	5		5	5		
Sideoats grama		5	10	10	10	5	15				20	25	10			5		25		20		
Slender wheatgrass	5		5		5	5			10	20	5	10				10		10		5		10
Slough sedge																					50	40
Switchgrass						20		20	25	20				10	10	15			20			
Thickspike wheatgrass[5/]	100	45	45	10	45	25	40	10	10	60	50	25	10	30	30	20	45	25	10	20		10
Western wheatgrass[4/]	100	45	45	10	45	25	40	10	10	60	50	25	10	30	30	20	45	25	10	20		10
Whitetop																					50	
Forbs [1/]																						
American licorice	5					5			5												5	
American vetch			5	5	5	5	5	5	5			5	5	5	5	5		5	5			
Blacksamson echinacea			5	5	5		5	5			5	5	5	5	5	5		5	5	5		
Blanket flower		5		5							5	5	5	5	5			5		5		
Cudweed sagewort		5	5	5	5	5	5				5	5	5	5	5	5	5	5				
Dotted gayfeather			5	5	5		5	5			5	5	5	5	5	5		5	5	5		
False boneset			5		5																	
False gromwell								5						5	5	5			5			
Groundplum milkvetch				5			5					5	5	5	5	5		5				
Indian breadroot scurfpe				5				5				5	5	5	5			5	5			
Ironweed	5																				5	

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 54

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group SD name	CD[3/]	Cp	Cy	LiSa	Ly	LyOv	LyT	Sa	Sb	SL	SwCy	SwLy	SwSy	Sy	SyCp	SyT	TCp	TLy	TSa	VSw	WL[2/]	WM[2/]
Forbs [1/]																						
Maximilian sunflower						5	5		5													5
New England aster																					5	
Plains coreopsis	5								5	5											5	
Prairie aster		5	5		5	5	5		5		5	5		5	5	5	5	5		5		
Prairie coneflower		5	5	5	5	5	5	5			5	5	5	5	5	5	5	5	5	5		
Purple prairieclover			5	5	5	5	5					5	5	5	5	5		5		5		
Scarlet globemallow		5	5	5	5		5					5	5	5	5	5	5	5		5		
Stiff goldenrod		5	5		5	5	5		5		5	5		5	5	5		5				
Stiff sunflower				5				5				5	5	5	5	5		5	5			
Water plantain	5									5												
Western yarrow		5	5	5	5	5	5		5		5	5	5	5	5	5	5	5				
White prairieclover			5	5	5	5	5					5	5	5	5	5		5		5		
Shrubs [1/]																						
Black currant						5	5															
Chokecherry						5	5		5							5						
False indigo									5													
Fringed sagewort		5	5	5	5		5	5			5	5	5	5	5	5	5	5	5	5		
Leadplant			5	5	5	5	5	5					5	5	5	5			5			
Prairie rose			5	5	5	5	5	5	5			5	5	5	5	5		5	5	5		
Silver buffaloberry							5					5				5		5				
Silver sagebrush		5	5		5		5				5	5		5	5	5	5	5				
Western snowberry			5		5	5	5		5			5		5	5	5		5				
Winterfat		5	5	5	5		5				5	5	5				5	5				

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ On these sites a minimum of two species must be planted.
3/ A single species is allowable on this site.
4/ Thickspike wheatgrass may be substituted if western wheatgrass is unavailable.
5/ Use only if western wheatgrass is unavailable.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 58D

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group SD name	CD[3/]	Cp	CS	Cy	CyOv	Ly	LyOv	LyT	Sa	SH	SL	SOv	SwCy	SwLy	SwSy	Sy	SyCp	SyT	TCp	TLy	TSy	VSw	WL[2/]	WM[2/]
Grasses																								
Alkali sacaton	10										20													
American sloughgrass	5																							20
Big bluestem				10		10	35	35		25				10	10	15	15	15		10	10			
Blue grama		20	5	10	10	10	10	10	5	10		10	15	10	10	10	10	10	25	10	10	20		
Bluejoint reedgrass																							35	15
Buffalograss		10		5	5	5	5	5				5	5	5					5	5		5		
Canada wildrye					5		5	5		5		5						10						
Fowl bluegrass	10																						10	5
Green needlegrass		5		30	30	30	30	30		20		30	35	15	5	5	5	15	5	15	5			
Indiangrass			10				5	5	10							5	5	10						
Little bluestem		5	15	5		5	10	10	15	35			15	15	25	15	15	10		15	25	20		
Needleandthread		20	30	15		15	15	15	30	15			5	20	25	30	30	25	10	20	25	35		
Nuttall's alkaligrass	30				20						35	20												
Porcupinegrass			5	5		5	10	10	5	5				5		10	10	10		5				
Prairie cordgrass											25												70	50
Prairie dropseed										10				5						5				
Prairie junegrass		5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5		
Prairie sandreed		5	40	5		5	15	15	40					5	35	30	30	35		5	35			
Sand bluestem			40						40						10	10	10				10			
Sand dropseed		5	5						5						5	5	5	5	5		5	5		
Sideoats grama				10		10	5	5		15			15	10	5					10	5	15		
Slender wheatgrass	10	10		10	20	10	10	10		10	10	20		5		5	5	10	5	5		5	5	
Slough sedge																							25	15
Switchgrass			20		5		15	15	20		15	5				10	10	15					10	10
Thickspike wheatgrass[5/]	100	50	5	50	45	50	40	40	5	15	50	45	45	40	20	30	30	30	50	40	20	25	5	5
Western wheatgrass [4/]	100	50	5	50	45	50	40	40	5	15	50	45	45	40	20	30	30	30	50	40	20	25	5	5
Whitetop																							15	10
Forbs [1/]																								
American licorice	5				5		5	5				5											5	5
American vetch		5		5	5	5	5	5				5	5	5	5	5	5	5	5	5	5			
Blacksamson echinacea			5	5		5	5	5	5	5			5	5	5	5	5			5	5	5		
Cudweed sagewort		5		5	5	5	5	5		5		5	5	5	5	5	5	5	5	5	5	5		
Dotted gayfeather			5	5		5	5	5	5	5			5	5	5	5	5	5		5	5	5		
False boneset				5	5	5				5		5		5		5	5			5				
False gromwell			5						5						5	5	5	5			5			
Groundplum milkvetch				5		5								5						5				
Indian breadroot scurfpe														5	5	5	5			5	5			

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 58D

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group	SD name	CD[3/]	Cp	CS	Cy	CyOv	Ly	LyOv	LyT	Sa	SH	SL	SOv	SwCy	SwLy	SwSy	Sy	SyCp	SyT	TCp	TLy	TSy	VSw	WL[2/]	WM[2/]
Forbs [1/]																									
Ironweed		5																						5	5
Maximilian sunflower						5		5	5				5						5						5
New England aster																								5	5
Plains coreopsis		5										5												5	5
Prairie aster			5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5		
Prairie coneflower			5		5	5	5	5	5		5		5	5	5	5	5	5	5		5	5	5		
Purple prairieclover			5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5		5	5	5		
Scarlet globemallow			5		5		5							5	5	5	5	5		5	5	5	5		
Stiff goldenrod			5		5	5	5	5	5				5				5	5	5						
Stiff sunflower				5						5						5	5	5				5			
Water plantain		5										5													5
Western yarrow			5		5	5	5	5	5		5		5	5	5	5	5	5	5	5	5	5			
White prairieclover			5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5		5	5	5		
Shrubs [1/]																									
Big sagebrush			5		5	5	5	5	5				5	5	5		5	5	5	5	5				
Black currant								5	5										5						
Chokecherry						5		5	5				5						5						
False indigo								5	5															5	5
Four-wing saltbush (dew			5			5						5	5												
Fringed sagewort			5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5		
Leadplant				5	5	5	5	5	5	5	5		5		5		5	5	5		5				
Prairie rose			5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5		5	5	5		
Silver buffaloberry					5	5	5	5	5				5												
Silver sagebrush			5	5	5	5	5	5	5	5			5	5	5		5	5	5	5	5				
Western snowberry			5		5	5	5	5	5		5		5		5		5	5	5		5				
Winterfat			5		5		5							5						5					

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ On these sites a minimum of two species must be planted.
3/ A single species is allowable on this site.
4/ Thickspike wheatgrass may be substituted if western wheatgrass is unavailable.
5/ Use only if western wheatgrass is unavailable.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 60A

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group SD name	CD 3/	COv	Cp	CSv	Cy	DC 2/	LOv	LT	Ly	PC	Sa	Sb	SDC 2/	SL 2/	SU 2/	Sw	SwC	Sy	TCp	TU	VSw
Grasses																					
Alkali sacaton														30	30						
Big bluestem		30		20			50	20	15	20	10	50				15	10	30			
Blue grama		10	20	20	10	10	10	15	15		10		15		10	20	15	10	30	20	30
Canada wildrye		10					10									10				10	
Green needlegrass		30	30		50	10	20	30	25	10			5			10	30		10	10	5
Indiangrass		10					10				10	10						15			
Little bluestem			10	40	15		5		10	35	25					30	15	20	5	45	25
Needleandthread			15		10		10		25		20					20	5	25	15	25	25
Nuttall's alkaligrass	20													30	10						
Prairie cordgrass		10					5					30		30							
Prairie dropseed																10					
Prairie sandreed		15	10	10			15	20		35	35					15	10	40		20	10
Sand bluestem								10		20	50							30			
Sideoats grama		10	15		10	20	15	15	30	15			20			30	30	10	5	35	30
Slender wheatgrass	10	20					10							15		10				10	
Switchgrass		20					25	10		15	10	25		20	20			10			
Thickspike wheatgrass 5/	100	50	40	30	60	80	40	50	40	25	15	25	80	60	50	30	50	20	50	30	20
Western wheatgrass 4/	100	50	40	30	60	80	40	50	40	25	15	25	80	60	50	30	50	20	50	30	20
Forbs 1/																					
Blacksamson echinacea			5	5	5			5	5	5	5					5	5	5		5	5
Canada milkvetch			5	5	5		5	5	5		5							5			
Dotted gayfeather			5	5	5			5	5	5	5					5	5	5		5	5
Maximilian sunflower		5	5	5	5		5	5	5		5	5						5			
Plains coreopsis	5						5					5									
Prairie coneflower			5	5	5			5	5	5	5					5		5		5	
Purple prairieclover			5	5	5			5	5	5	5					5	5	5		5	5
Stiff sunflower		5	5	5	5		5	5	5		5	5				5		5		5	
Western yarrow		5	5	5	5		5	5	5	5	5	5				5	5	5		5	5
White prairieclover			5	5	5			5	5		5					5	5	5		5	5
Shrubs 1/																					
Big sagebrush		5	5		5	5	5	5	5				5	5	5	5	5		5		
Four-wing saltbush (dewi					5	5							5	10					5		
Fringed sagewort		5	5		5		5	5	5							5	5		5		
Gardner's saltbush														5	20				5		
Leadplant				5	5		5	5	5	5	5					5	5	5		5	5
Sand sagebrush											5							5			
Silver sagebrush		5	5				5	5								5	5		5		
Western snowberry				5	5		5	5	5		5							5		5	
Winterfat					5	5		5	5				5	5	10	5	5		5		

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 60A

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group	SD name	CD 3/	COv	Cp	CSv	Cy	DC 2/	LOv	LT	Ly	PC	Sa	Sb	SDC 2/	SL 2/	SU 2/	Sw	SwC	Sy	TCp	TU	VSw

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ On these sites a minimum of two species must be planted.
3/ A single species is allowable on this site.
4/ Thickspike wheatgrass may be substituted if western wheatgrass is unavailable.
5/ Use only if western wheatgrass is unavailable.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 61

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group SD name	Cy	LOv	LT	Ly	Sb	SH	SwLy	SwC	Sy	TU	VSw
Grasses											
Big bluestem	20	50	20	30	60	30	25	15	30	20	
Blue grama	15	10	10	10		5	10	10	10	10	25
Canada wildrye	5	10	10	5	15	10	5				
Green needlegrass	40	20	30	30		20	10	30		10	10
Indiangrass	10	10		10	25	10			15	10	
Little bluestem	10	15	15	15	15	30	40	25	30	45	15
Needleandthread	10		15	25		15	20	10	25	30	35
Prairie cordgrass					15						
Prairie dropseed				10		15	10			10	
Prairie sandreed		5	20				10	10	35	10	
Sand bluestem									30		
Sideoats grama	20	20	15	20		20	30	25	10	25	20
Slender wheatgrass	5	15	15	10	15	10	10		10	10	
Switchgrass	10	20	15	10	25	10	5		10		
Thickspike wheatgrass 3/	50	30	40	40	20	20	30	45	20	25	20
Western wheatgrass 2/	50	30	40	60	20	20	30	45	20	25	20
Forbs 1/											
Blacksamson echinacea	5		5	5		5	5	5	5	5	5
Canada milkvetch	5	5	5	5	5				5		
Dotted gayfeather	5		5	5		5	5	5	5	5	5
Maximilian sunflower	5	5	5	5	5				5		
Plains coreopsis		5			5						
Prairie coneflower	5		5	5		5	5		5	5	
Purple prairieclover	5	5	5	5		5	5	5	5	5	5
Stiff sunflower	5	5	5	5	5		5		5	5	
Western yarrow	5	5	5	5	5	5	5	5	5	5	5
White prairieclover	5		5	5		5	5	5	5	5	5
Shrubs 1/											
Big sagebrush	5		5	5			5	5			
Fringed sagewort	5		5	5			5	5		5	5
Leadplant	5	5	5	5	5	5	5	5	5	5	5
Sand sagebrush									5		
Silver sagebrush			5				5	5			
Western snowberry	5	5	5	5	5	5			5	5	
Winterfat	5			5			5	5			

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ Thickspike wheatgrass may be substituted if western wheatgrass is unavailable.
3/ Use only if western wheatgrass is unavailable.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 62

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group/Species	Cy	HCOv	HCS	HCSw	LOv	Ly	MP	Sb	SH	Sv	Sw	TU
Grasses												
Big bluestem	15				20	15	15	20	15	15	15	15
Blue grama	20					20	20		20	20	20	20
Green needlegrass	20	30	30	30	10	20	10	10	10	10	10	20
Little bluestem	20					20	20		20	20	20	20
Mountain brome		20	20	20								
Prairie sandreed					20		15	20	15	15	15	
Sandberg bluegrass		50	50	50	40			40				
Sideoats grama	20					20	20		20	20	20	20
Slender wheatgrass 3/		50	50	50								
Switchgrass					20			20				
Thickspike wheatgrass 3/		50	50	50								
Virginia wildrye	10					10						10
Western wheatgrass 2/	20				10	20	20	10	20	20	20	20
Forbs 1/												
Blacksamson echinacea	5	5	5	5		5	5		5	5	5	5
Canada milkvetch	5	5	5	5	5	5	5	5	5	5	5	5
Dotted gayfeather	5	5	5	5		5	5		5	5	5	5
Maximilian sunflower					5			5				
Prairie coneflower	5	5	5	5		5	5		5	5	5	5
Purple prairieclover	5	5	5	5		5	5		5	5	5	5
Stiff sunflower					5			5				
Western yarrow	5	5	5	5	5	5	5	5	5	5	5	5
White prairieclover	5	5	5	5		5	5		5	5	5	5
Shrubs 1/												
Chokecherry	5				5	5		5				5
Golden currant	5				5	5		5				5
Juneberry	5				5	5		5				5
Leadplant							5		5	5	5	
Redosier dogwood					5			5				
Silver buffaloberry	5	5	5	5	5	5	5	5	5	5	5	5
Western snowberry					5			5				

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ Thickspike or slender wheatgrass may be substituted if western wheatgrass is unavailable.
3/ Thickspike or slender wheatgrass can be used separately or in combination on these sites. Total maximum percentage that these species can make of the seeding either separately or in combination is 50 percent.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 63A

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group/Species	CD 3/	COv	Cp	CSa	Cy	DC	LOv	LT	Ly	Sa	Sb	SH	SL 2/	SM 2/	Sw	SwC	SwG	Sy	TCp	TU	VSw	WL 2/
Grasses																						
Alkali sacaton													30						20			
American sloughgrass														10								10
Big bluestem		40		10	15		40	20	15	20	50	20			20	20		20				
Blue grama		10	30	20	20		10	10	20	20		20	20		20	20	30	20	40	30	30	
Canada wildrye		10					10															
Green needlegrass		50	30		40	40	50	50	40			15			25	25			10			
Indiangrass		10		20	10		10	10	10	20	25							20				
Little bluestem		20	10	40	20		20	25	20	40	25	40			50	50	30	40		30	30	
Needleandthread		10	20		20		10	20	20	25					20	20	30	25		30	30	
Nuttall's alkaligrass													30						20			
Prairie cordgrass														60								60
Prairie dropseed												10										
Prairie sandreed		20	20	40	10		20		10	40					10	10	20	40			20	
Sand bluestem				30						30								30				
Sideoats grama		20	20	20	30	20	20	25	30	20		20			40	40	30	20	20	30	30	
Slough sedge														60								60
Switchgrass		20		20			20	25		20	25		20					20				
Thickspike wheatgrass 5/	100	50	40		50	70	50	50	50	20	25	10	80	10	30	30	20	20	60	30	20	10
Western wheatgrass 4/	100	50	40		50	70	50	50	50	20	25	10	80	10	30	30	20	20	60	30	20	10
Whitetop														50								50
Forbs 1/																						
Blacksamson echinacea			5		5			5	5	5		5			5	5	5	5		5	5	
Canada milkvetch			5		5			5	5	5								5				
Dotted gayfeather			5		5			5	5	5		5			5	5	5	5		5	5	
Illinois bundleflower			5		5			5	5	5					5	5	5	5			5	
Maximilian sunflower		5	5	5	5		5	5	5	5	5							5				
Plains coreopsis	5													5								5
Prairie coneflower			5		5			5	5	5		5						5		5		
Purple prairieclover			5		5			5	5	5		5			5	5	5	5		5	5	
Stiff sunflower		5	5	5	5		5	5	5	5	5							5				
Western yarrow		5	5	5	5		5	5	5	5	5	5			5	5	5	5		5	5	
White prairieclover			5		5			5	5	5		5			5	5	5	5		5	5	
Shrubs 1/																						
Leadplant					5			5	5	5		5			5	5	5	5			5	
Western snowberry					5			5	5	5		5						5				

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ On these sites a minimum of two species must be planted.
3/ A single species is allowable on this site.
4/ Thickspike wheatgrass may be substituted if western wheatgrass is unavailable.
5/ Use only if western wheatgrass is unavailable.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 66

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group SD name	CD [3/]	CS	Ly	LyOv	LyT	Sa	Sb	SSb	SwG	Sy	SyLi	SyLL	TU	WL [2/]	WsB
Grasses															
Alkali sacaton								40							
Big bluestem			30	40	20		50			35	25		20		40
Blue grama		5	10		5	10		5	20	10	10	10	20		
Bluejoint reedgrass														30	20
Buffalograss	5		5		5						5		5		
Canada wildrye				5			10				5				
Green needlegrass	5		35	20	15		5		5		10		15		
Indiangrass		15	15	15	10	15	25			15	5	10			25
Little bluestem		30	15	20	10	30	20	10	15	30	35	30	35		
Needleandthread		15	20		20	15	5		25	20	20	15	20		
Nuttall's alkaligrass	5							10							
Porcupinegrass		10	15	5	10	15	5		10	10	20		20		
Prairie cordgrass							5	15						75	40
Prairie dropseed			5							5	5		5		
Prairie sandreed		30			10	35			25	35	15	30	5		
Sand bluestem		40				40			35	40	25	45			
Sand dropseed		5	5		5	5			5	5	5	5			
Sideoats grama			15	15	15		10		15	5	35		25		
Slender wheatgrass	5			5			10	10						10	15
Slough sedge														35	10
Switchgrass		20	15	20	15	20	20	25		20	5	25			35
Western wheatgrass	100		25	25	40		10	30	10	10	15	10	20		5
Whitetop														10	
Forbs [1/]															
American licorice				5	5		5							5	5
American vetch			5	5	5						5				
Black-eyed Susan							5								5
Blacksamson echinacea			5		5	5					5		5		
Blue vervain			5	5	5		5		5	5		5			
Canada tick trefoil				5			5								
Cudweed sagewort			5	5	5		5	5	5	5	5	5	5		
Dotted gayfeather		5	5	5	5	5			5	5	5	5	5		
False boneset			5	5	5		5					5	5		
False gromwell			5												
Groundplum milkvetch			5		5						5		5		
Heath aster			5	5	5		5		5	5	5	5	5		5
Illinois bundleflower		5	5			5	5			5					
Indian breadroot scurfpea			5							5	5				
Maximilian sunflower				5			5								
New England aster														5	5
Plains coreopsis	5						5	5						5	5

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 66

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group SD name	CD 3/	CS	Ly	LyOv	LyT	Sa	Sb	SSb	SwG	Sy	SyLi	SyLL	TU	WL 2/	WsB
Prairie coneflower			5		5	5	5		5	5	5	5	5		
Purple prairieclover			5	5	5	5	5		5	5	5	5	5		
Scarlet globemallow			5		5				5	5			5		
Stiff goldenrod			5	5	5	5	5			5	5	5			
Stiff sunflower		5	5			5	5		5	5	5	5			
Western yarrow				5	5		5				5				
White prairieclover			5	5	5	5	5		5	5	5	5	5		
Shrubs 1/															
Black currant				5	5		5								
Chokecherry				5			5								
False indigo				5	5		5							5	5
Fringed sagewort			5						5		5		5		
Leadplant		5	5	5		5	5		5	5	5	5	5		
Prairie rose		5	5	5		5	5		5	5	5	5	5		
Silver buffaloberry					5										
Silver sagebrush					5										
Western snowberry			5	5			5						5		

1/ Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/ On these sites a minimum of two species must be planted.
3/ A single species is allowable on this site.

TABLE 5. RANGE SEEDING RATES AND MIXTURES (Continued)

MLRA 102A

Maximum Percentage of Species per Ecological Site (Four Species Minimum)

Group	SD name	COv	Cp	Cy	LOv	LSb	Ly	Sa	Sb	SL 2/	SM 2/	SSb	Sw	SwC	SwG	Sy	TU	VSw	WL 2/	WM 2/
Grasses																				
	Alkali sacaton									30										
	American sloughgrass										10								10	10
	Big bluestem	40		25	40	40	25	20	60			40	20	20	10	20	20	10		
	Blue grama		20					10					10	10	20	10	10	20		
	Canada wildrye	10			10	10			10			10								
	Green needlegrass	25	30	20	25	20	20					20	30	30	15		30	15		
	Indiangrass	30		20	30	10	20	20	30			10	10	10		20	10			
	Little bluestem	20	15	30	20	50	30	30	25			50	30	30	25	30	30	25		
	Needleandthread		15	10		10	10	20				10	20	20	25	20	20	25		
	Nuttall's alkaligrass									30										
	Porcupinegrass	10		20	10		20	20					10	10		20	10			
	Prairie cordgrass									20	60								60	60
	Prairie dropseed							10					10	10		10	10			
	Prairie sandreed		10	10			10	20					10	10		20	10			
	Sand bluestem							30								30				
	Sideoats grama	10	20	15	10	10	15	10				10	20	20	20	10	20	20		
	Slender wheatgrass	10	10	10	10	10	10	5	10			10	10	10	5	5	10	5		
	Slough sedge										60								60	60
	Switchgrass	30	10	20	30	10	20	20	25	50		10	10	10		20	10			
	Virginia wildrye	10			10	10			10			10								
	Western wheatgrass	20	50	20	20		20	20	10	70	10		20	20	15	20	20	15	10	10
	Whitetop										50								50	50
Forbs 1/																				
	Blacksamson echinacea		5	5			5	5					5	5	5	5	5	5		
	Canada milkvetch		5	5			5	5								5				
	Dotted gayfeather		5	5			5	5	5				5	5	5	5	5	5		
	Illinois bundleflower		5	5			5	5					5	5	5	5	5	5		
	Maximilian sunflower	5	5	5	5	5	5	5				5				5				
	Plains coreopsis										5								5	5
	Prairie coneflower		5	5			5	5	5							5				
	Purple prairieclover		5	5			5	5	5				5	5	5	5	5	5		
	Stiff sunflower	5	5	5	5	5	5	5				5				5				
	Western yarrow	5	5	5	5	5	5	5				5	5	5	5	5	5	5		
	White prairieclover		5	5			5	5					5	5	5	5	5	5		
Shrubs 1/																				
	Leadplant			5			5	5					5	5	5	5	5	5		
	Western snowberry			5			5	5								5				

1/Forbs and shrubs can comprise a maximum of 10 percent of the seeding. If the purpose is for a pollinator seeding, there is no maximum amount of forbs/shrubs that may be included in the seeding mixture.
2/On these sites a minimum of two species must be planted.

TABLE 6A. PRAIRIE RESTORATION
TALL-GRASS PRAIRIE REGION -- MLRAs 56, 102A, 102B, 102C
SPECIES SELECTION[1/]

		Maximum percentage of species and adaptability per ecological site																		
Group	**SD name**	**COv**	**Cp**	**Cy**	**LOv**	**LSb**	**Sa**	**Sb**	**Ly**	**SL**	**SM**	**SSb**	**Sw**	**SwC**	**SwG**	**Sy**	**TU**	**VSw**	**WL**	**WM**
GRASSES & GRASS-LIKES [2/]																				
Alkali sacaton										30										
American sloughgrass											10								10	10
Big bluestem		40		25	40	40	20	60	25			40	20	20	10	20	20	10		
Blue grama			20	10			10		10				10	10	20	10	10	20		
Bluejoint reedgrass											25								25	25
Buffalograss			20	10			10		10				10	10	20	10	10	20		
Canada wildrye		10		10	10	10		10	10			10								
Green needlegrass		25	30	20	25	20			20			20	30	30	15		30	15		
Indiangrass		30		20	30	10	20	30	20			10	10	10		20	10			
Inland saltgrass										70										
Little bluestem		20	15	30	20	50	30	25	30			50	30	30	25	30	30	25		
Needleandthread			15	10		10	20		10			10	20	20	25	20	20	25		
Nuttall's alkaligrass										30										
Porcupinegrass		10		20	10		20		20				10	10		20	10			
Prairie cordgrass										20	60								60	60
Prairie dropseed		10	10	10	10	10	10	10	10			10	10	10		10	10			
Prairie junegrass		5	5	5	5		10		5				10	10	10	10	10	10		
Prairie sandreed			10	10			20		10				10	10		20	10			
Sand bluestem							30									30				
Sideoats grama		10	20	15	10	10	10		15			10	20	20	20	10	20	20		
Slender wheatgrass		10	10	10	10		10	10	10	10	10		10	10	10	10	10	10	10	10
Slough sedge											60								60	60
Switchgrass		30	10	20	30	10	20	25	20	50		10	10	10		20	10			
Virginia wildrye		10			10	10		10				10								
Western wheatgrass		20	50	20	20		20	10	20	70	10		20	20	15	20	20	15	10	10
Whitetop											50								50	50
FORBS & SHRUBS	[2/, 3/]																			
American licorice		X			X	X					X	X							X	X
Black-eyed Susan			X	X			X	X	X				X	X	X	X	X	X		
Blue vervain		X			X	X		X			X	X							X	X
Boneset		X			X	X		X			X	X							X	X
Butterfly milkweed		X	X	X	X		X		X							X				
Canada milkvetch			X	X			X		X							X				
Canada tick trefoil		X	X	X	X	X	X	X	X			X				X				
Chokecherry													X	X			X			
Common milkweed		X	X	X	X	X	X	X	X		X	X	X	X		X	X		X	X
Compass plant		X		X	X	X		X	X			X	X	X			X			
Cudweed sagewort		X	X	X	X	X	X	X	X			X				X				

TABLE 6A. PRAIRIE RESTORATION
TALL-GRASS PRAIRIE REGION -- MLRAs 56, 102A, 102B, 102C
SPECIES SELECTION[1/]

		Maximum percentage of species and adaptability per ecological site																		
Group	**SD name**	**COv**	**Cp**	**Cy**	**LOv**	**LSb**	**Sa**	**Sb**	**Ly**	**SL**	**SM**	**SSb**	**Sw**	**SwC**	**SwG**	**Sy**	**TU**	**VSw**	**WL**	**WM**
Culvers root		X			X	X		X			X	X							X	X
Cup plant		X			X	X		X			X	X							X	X
Dotted gayfeather			X	X			X		X				X	X	X	X	X	X		
Dwarf indigo				X			X		X				X	X	X	X	X	X		
False indigo		X			X															
False sunflower		X	X	X	X	X	X	X	X			X				X				
Fragrant giant hyssop		X	X	X	X	X	X	X	X			X	X	X	X	X	X	X		
Fringed sagewort		X	X	X	X				X		X								X	X
Golden alexanders		X	X	X	X		X	X	X							X				
Gray goldenrod			X	X			X		X				X	X	X	X	X	X		
Grayhead coneflower			X	X			X		X							X				
Groundplum milkvetch		X	X	X	X		X		X				X	X	X	X	X	X		
Heath aster		X	X	X	X		X		X				X	X		X	X			
Hoary vervain		X	X	X	X	X	X		X			X	X	X	X	X	X	X		
Illinois bundleflower			X	X			X		X				X	X	X	X	X	X		
Illinois tick trefoil		X			X		X									X				
Indian blanket			X	X			X		X				X	X	X	X	X	X		
Indian breadroot scurfpea		X	X	X	X		X		X				X	X		X	X			
Ironweed		X			X	X		X			X	X							X	X
Joe-pye weed		X			X	X		X			X	X							X	X
Leadplant				X			X		X				X	X	X	X	X	X		
Maximilian sunflower		X	X	X	X	X	X	X	X			X				X				
Meadow blazing star		X	X	X	X	X		X	X			X								
Narrowleaf purple coneflowe			X	X		X	X		X			X	X	X	X	X	X	X		
New England aster			X	X			X		X							X				
Plains coreopsis		X			X	X		X			X	X							X	X
Prairie cinquefoil		X	X	X	X		X		X				X	X		X	X			
Prairie coneflower			X	X			X		X							X				
Prairie rose				X			X		X							X				
Purple prairieclover			X	X			X		X				X	X	X	X	X	X		
Rough blazing star		X	X	X	X	X	X	X	X			X	X	X	X	X	X	X		
Round-headed bush clover			X	X			X		X							X				
Shell-leaf penstemon		X	X	X	X	X	X	X	X			X	X	X	X	X	X	X		
Showy partridgepea		X		X	X		X		X							X				
Silver buffaloberry													X	X			X			
Stiff goldenrod			X	X			X		X				X	X	X	X	X	X		
Stiff sunflower		X	X	X	X	X	X	X	X			X				X				
Swamp milkweed		X			X	X		X			X	X							X	X
Tall meadow rue		X	X	X	X	X		X	X			X								

TABLE 6A. PRAIRIE RESTORATION
TALL-GRASS PRAIRIE REGION -- MLRAs 56, 102A, 102B, 102C
SPECIES SELECTION[1/]

		Maximum percentage of species and adaptability per ecological site																		
Group	**SD name**	**COv**	**Cp**	**Cy**	**LOv**	**LSb**	**Sa**	**Sb**	**Ly**	**SL**	**SM**	**SSb**	**Sw**	**SwC**	**SwG**	**Sy**	**TU**	**VSw**	**WL**	**WM**
Thickspike gayfeather		X		X	X	X		X	X			X								
Water plantain											X								X	X
Western snowberry		X		X	X		X		X							X				
Western yarrow		X	X	X	X	X	X	X	X			X	X	X	X	X	X	X		
White prairieclover			X	X			X		X				X	X	X	X	X	X		
Wild bergamot		X	X	X	X	X	X	X	X			X	X	X	X	X	X	X		

1/ All eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.
2/ If site is a wetland, refer to Wetland Restoration (657).
3/ No individual forb or shrub species should make up more than three percent of the mixture.

TABLE 6b. PRAIRIE RESTORATION
MIXED-GRASS PRAIRIE REGION -- MLRAs 53B, 53C, 54, 55B, 55C, 58D, 60A, 61, 63A, 63B, 64, 65, 66
SPECIES SELECTION[1/]

	Maximum percentage of species and adaptability per ecological site																												
Group/Species	**CD**	**COv**	**Cp**	**CSa**	**CSv**	**Cv**	**DC**	**LOv**	**LSb**	**LT**	**PC**	**Sa**	**Sb**	**SDC**	**SH**	**Lv**	**SL**	**SM**	**SSb**	**SU**	**Sw**	**SwC**	**SwG**	**Sv**	**TCp**	**TU**	**VSw**	**WL**	**WM**
GRASSES & GRASS-LIKES [2/]																													
Alkali sacaton																	30			30					20				
American sloughgrass																		10										10	10
Big bluestem		40		10	20	15		40	50	20	20	20	50		20	15			50		20	20		20		20			
Blue grama		10	30	20	20	20		10	10	10		20	10		20	20	20		10	20	30	30	40	20	40	30	40		
Bluejoint reedgrass																		25										25	25
Buffalograss			10		10	10									10	10							10				10		
Canada wildrye		10						10																					
Green needlegrass		50	30			40	40	50	10	50	20		10	40	15	40			10		25	25			10	25			
Indiangrass		10		20		10		10	20	10		20	20			10			20					20					
Inland saltgrass																	70			70									
Little bluestem		20	10	40	40	20		20	40	25	20	40	40		40	20			40		50	50	30	40		50	30		
Needleandthread		10	20			20		10		20		25				20					20	20	30	25		20	30		
Nuttall's alkaligrass																	30			30					20				
Porcupinegrass		10				20		10				20				20					10	10		20		10			
Prairie cordgrass																		60										60	60
Prairie dropseed															10														
Prairie junegrass		5	5			5		5				10				5					10	10	10	10		10	10		
Prairie sandreed		20	20	40	10	10		20			30	40				10					10	10	20	40		10	20		
Sand bluestem				40							25	30												30					
Sideoats grama		20	20	20		30	20	20	20	25	20	20	20	20	20	30			20		40	40	30	20	20	40	30		
Slender wheatgrass		10	10			10		10	10			10	10			10	10	10	10	10	10	10	10	10		10	10	10	10
Slough sedge																		60										60	60
Switchgrass		20		20				20	20	25	20	20	20				20		20	20				20					
Virginia wildrye		10						10	10				10						10										
Western wheatgrass	100	50	40		30	30	80	50	20	50	25	20	20	80	10	30	80	10	20	80	30	30	20	20	60	30	20	10	10
Whitetop																		50										50	50
FORBS & SHRUBS [2/, 3/]																													
American licorice		X						X	X				X					X	X									X	X
Big sagebrush [4/]		X	X			X	X	X		X				X		X					X	X			X	X			
Black-eyed Susan			X	X	X	X			X	X		X	X		X	X			X		X	X	X	X		X	X		
Blue vervain		X						X	X				X					X	X									X	X
Boneset		X						X	X				X					X	X									X	X
Canada milkvetch			X	X	X	X				X		X				X								X					
Canada tick trefoil		X	X	X	X	X		X	X	X		X	X			X			X					X					
Chokecherry																					X	X				X			
Common milkweed		X	X	X	X	X		X	X	X		X	X		X	X		X	X		X	X		X		X		X	X
Compass plant		X			X	X		X	X	X			X		X	X			X		X	X				X			
Cudweed sagewort		X	X	X	X	X	X	X	X	X		X	X	X		X			X					X					

TABLE 6b. PRAIRIE RESTORATION
MIXED-GRASS PRAIRIE REGION -- MLRAs 53B, 53C, 54, 55B, 55C, 58D, 60A, 61, 63A, 63B, 64, 65, 66
SPECIES SELECTION[1/]

	Maximum percentage of species and adaptability per ecological site																												
Group/Species	**CD**	**COv**	**Cp**	**CSa**	**CSv**	**Cv**	**DC**	**LOv**	**LSb**	**LT**	**PC**	**Sa**	**Sb**	**SDC**	**SH**	**Lv**	**SL**	**SM**	**SSb**	**SU**	**Sw**	**SwC**	**SwG**	**Sv**	**TCp**	**TU**	**VSw**	**WL**	**WM**
Dotted gayfeather			X	X	X	X				X	X	X			X	X					X	X	X	X	X	X	X		
Dwarf indigo				X	X	X				X	X	X			X	X					X	X	X	X		X	X		
False indigo		X						X																					
False sunflower		X	X	X	X	X		X	X	X		X	X			X			X					X					
Fragrant giant hyssop		X	X	X	X	X		X	X	X		X	X		X	X			X		X	X	X	X		X	X		
Fringed sagewort		X	X			X		X		X						X					X	X			X	X			
Gardner's saltbush 4/																	X			X									
Gray goldenrod			X	X	X	X				X		X			X	X					X	X	X	X		X	X		
Groundplum milkvetch		X	X	X	X	X		X		X	X	X			X	X					X	X	X	X	X	X	X		
Heath aster		X	X	X	X	X		X		X		X			X	X					X	X		X	X	X			
Hoary vervain		X	X	X	X	X		X	X	X		X	X		X	X			X		X	X	X	X	X	X	X		
Illinois bundleflower			X	X	X	X				X		X			X	X					X	X	X	X		X	X		
Indian blanket			X	X	X	X				X		X			X	X					X	X	X	X	X	X	X		
Indian breadroot scurfpe		X	X	X	X	X	X	X		X	X	X		X	X	X					X	X		X	X	X			
Ironweed		X						X	X				X					X	X									X	X
Joe-pye weed		X						X	X				X					X	X									X	X
Leadplant				X	X	X				X	X	X			X	X					X	X	X	X		X	X		
Maximilian sunflower		X	X	X	X	X		X	X	X		X	X			X			X					X					
Narrowleaf purple conefl			X	X	X	X			X	X		X	X		X	X			X		X	X	X	X		X	X		
New England aster			X	X	X	X				X		X				X								X					
Plains coreopsis		X						X	X				X					X	X									X	X
Prairie cinquefoil		X	X	X	X	X		X		X		X			X	X					X	X		X		X			
Prairie coneflower			X	X	X	X				X		X				X								X					
Prairie rose				X	X	X	X			X		X		X		X								X					
Purple prairieclover			X	X	X	X				X		X			X	X					X	X	X	X	X	X	X		
Rough blazing star		X	X	X	X	X		X	X	X		X	X		X	X			X		X	X	X	X	X	X	X		
Round-headed bush clov			X	X	X	X				X		X				X								X					
Sand sagebrush 4/												X												X					
Shell-leaf penstemon		X	X	X	X	X		X	X	X		X	X		X	X			X		X	X	X	X		X	X		
Silver buffaloberry																					X	X				X			
Silver sagebrush		X	X					X		X											X	X			X	X			
Stiff goldenrod			X	X	X	X	X			X	X	X		X	X	X					X	X	X	X	X	X	X		
Stiff sunflower		X	X	X	X	X	X	X	X	X	X	X	X	X		X			X					X					
Swamp milkweed		X						X	X				X					X	X									X	X
Tall meadow rue		X	X		X	X		X	X	X			X			X			X										
Water plantain																		X										X	X
Western snowberry		X		X	X	X		X		X		X				X								X					
Western yarrow		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X		
White prairieclover			X	X	X	X				X		X			X	X					X	X	X	X	X	X	X		

TABLE 6b. PRAIRIE RESTORATION
MIXED-GRASS PRAIRIE REGION -- MLRAs 53B, 53C, 54, 55B, 55C, 58D, 60A, 61, 63A, 63B, 64, 65, 66
SPECIES SELECTION[1/]

	Maximum percentage of species and adaptability per ecological site																											
Group/Species	**CD**	**COv**	**Cp**	**CSa**	**CSv**	**Cv**	**DC**	**LOv**	**LSb**	**LT**	**PC**	**Sa**	**Sb**	**SDC**	**SH**	**Lv**	**SL**	**SM**	**SSb**	**SU**	**Sw**	**SwC**	**SwG**	**Sv**	**TCp**	**TU**	**VSw**	**WL**	**WM**
Wild bergamot		X	X	X	X	X		X	X	X		X	X		X	X			X		X	X	X	X	X	X	X		
Winterfat 4/						X	X							X		X	X			X	X	X				X			

1/All eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.
2/If site is a wetland, refer to Wetland Restoration (657).
3/No individual forb or shrub species should make up more than three percent of the mixture.
4/This species should only be used in MLRA's 58D, 61, and 60A (13-16 inch precipitation zone).

TABLE 6A. PRAIRIE RESTORATION
TALL-GRASS PRAIRIE REGION – MLRA'S 102A, 102B, 102C, 56
SPECIES SELECTION[1/]

		Minimum and maximum percentage of grasses and grass-likes by species and ecological site[2/]									
		Cy, Ly	CyOv, LyOv	Cp	LSb, SSb	SL	Sa, Sy	Sw, SwLy SwC, TU	SM, WL, WM	SwG, VSw	Sb
GRASSES & GRASS-LIKES		**70-90**	**65-95**	**75-90**	**80-90**	**100**	**70-90**	**70-90**	**75-90**	**70-90**	**80-90**
Common Name	**Scientific Name**										
Alkali sacaton	*Sporobolus airoides*					0-30					
American sloughgrass	*Beckmannia syzigachne*								0-10		
Big bluestem	*Andropogon gerardii*	10-25	20-40		10-40		0-20	10-20		0-10	30-60
Blue grama	*Bouteloua gracilis*	0-10		0-20			0-10	0-10		0-20	
Bluejoint reedgrass	*Calamagrostis canadensis*								0-25		
Buffalograss	*Bouteloua dactyloides*	0-10		0-20			0-10	0-10		0-20	
Canada wildrye	*Elymus canadensis*	0-10	0-10		0-10						0-10
Green needlegrass	*Nassella viridula*	0-20	0-25	0-30	0-20			0-30		0-15	
Indiangrass	*Sorghastrum nutans*	0-20	10-30		0-10		0-20	0-10			10-30
Inland saltgrass	*Distichlis spicata*					20-70					
Little bluestem	*Schizachyrium scoparium*	15-30	0-20	0-15	10-50		10-30	10-30		10-25	0-25
Needleandthread	*Hesperostipa comata*	0-10		0-15	0-10		0-20	0-20		0-25	
Nuttall's alkaligrass	*Puccinella nuttalliana*					0-30					
Porcupine grass	*Hesperostipa spartea*	0-20	0-10				0-20	0-10			
Prairie cordgrass	*Spartina pectinata*					0-20			0-60		
Prairie dropseed	*Sporobolus heterolepis*	0-10	0-10	0-10	0-10		0-10	0-10			0-10
Prairie Junegrass	*Koeleria macrantha*	0-5	0-5	0-5			0-10	0-10		0-10	
Prairie sandreed	*Calamovilfa longifolia*	0-10		0-10			10-20	0-10			
Sand bluestem	*Andropogon hallii*						0-30				
Sideoats grama	*Bouteloua curtipendula*	0-15	0-10	10-20	0-10		0-10	0-20		10-20	
Slender wheatgrass	*Elymus trachycaulus*	0-10	0-10	0-10		0-10	0-10	0-10	0-10	0-10	0-10
Slough sedge	*Carex atherodes*								0-60		
Switchgrass	*Panicum virgatum*	0-20	0-30	0-10	0-10	20-50	0-20	0-10			0-25
Virginia wildrye	*Elymus virginicus*		0-10		0-10						0-10
Western wheatgrass	*Pascopyrum smithii*	0-20	0-20	25-50		20-70	0-20	0-20	0-10	0-15	0-10
Whitetop	*Scolochloa festucacea*								0-50		

[1/] ll eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.

[2/] If site is a wetland, refer to Wetland Restoration (657).

TABLE 6A. PRAIRIE RESTORATION (Continued)
TALL-GRASS PRAIRIE REGION – MLRA'S 102A, 102B, 102C, 56
SPECIES SELECTION[1/]

		Minimum and maximum percentage of forbs and shrubs and adaptability by ecological site[2/]									
		Cy, Ly	CyOv, LyOv	Cp	LSb, SSb	SL	Sa, Sy	Sw, SwLy, SwC, TU	SM, WL, WM	SwG, VSw	Sb
	FORBS & SHRUBS[3/]	**10-30**	**5-35**	**10-25**	**10-20**	**0**	**10-30**	**10-30**	**10-25**	**10-30**	**10-20**
Common Name	**Scientific Name**										
American licorice	*Glycyrrhiza lepidota*		X		X				X		
Black Samson	*Echinacea angustifolia*	X		X	X		X	X		X	
Black-eyed Susan	*Rudbeckia hirta*	X		X			X	X		X	X
Blanket flower	*Gaillardia aristata*	X		X			X				
Blue vervain	*Verbena hastata*		X		X				X		X
Boneset	*Eupatorium perfoliatum*		X		X				X		X
Buffaloberry	*Shepherdia argentea*							X			
Butterfly milkweed	*Asclepias tuberose*	X	X	X			X				
Canada milkvetch	*Astragalus canadensis*	X		X			X				
Canada tick trefoil	*Desmodium canadense*	X	X	X	X		X				X
Chokecherry	*Prunus virginiana*							X			
Common milkweed	*Asclepias syriaca*	X	X	X	X		X	X	X		X
Compass plant	*Silphium laciniatum*	X	X		X			X			X
Cudweed sagewort	*Artemisia ludoviciana*	X	X	X	X		X				X
Culvers root	*Veronicastrum virginicum*		X		X				X		X
Cup plant	*Silphium perfoliatum*		X		X				X		X
Dotted gayfeather	*Liatris punctata*	X		X			X	X		X	
Dwarf indigo	*Amorpha nana*	X					X	X		X	
False indigo	*Amorpha fruticosa*		X								
False sunflower	*Heliopsis helianthoides*	X	X	X	X		X				X
Fragrant giant hyssop	*Agastache foeniculum*	X	X	X	X		X	X		X	X
Fringed sagewort	*Artemisia frigida*	X	X	X					X		
Golden Alexanders	*Zizia aurea*	X	X	X			X				X
Gray goldenrod	*Solidago nemoralis*	X		X			X	X		X	
Grayhead coneflower	*Ratibida pinnata*	X		X			X				
Ground plum milkvetch	*Astragalus crassicarpus*	X	X	X			X	X		X	

[1/] All eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.

[2/] If site is a wetland, refer to Wetland Restoration (657).

[3/] No individual forb or shrub species should make up more than three percent of the mixture.

TABLE 6A. PRAIRIE RESTORATION (Continued)
TALL-GRASS PRAIRIE REGION – MLRA'S 102A, 102B, 102C, 56
SPECIES SELECTION[1/]

		Minimum and maximum percentage of forbs and shrubs and adaptability by ecological site[2/]									
		Cy, Ly	CyOv, LyOv	Cp	LSb, SSb	SL	Sa, Sy	Sw, SwLy, SwC, TU	SM, WL, WM	SwG, VSw	Sb
	FORBS & SHRUBS[3/]	**10-30**	**5-35**	**10-25**	**10-20**	**0**	**10-30**	**10-30**	**10-25**	**10-30**	**10-20**
Common Name	**Scientific Name**										
Heath aster	*Symphyotrichum ericoides*	X	X	X			X	X			
Hoary vervain	*Verbena stricta*	X	X	X	X		X	X		X	
Illinois bundleflower	*Desmanthus illinoensis*	X		X			X	X		X	
Illinois tick trefoil	*Desmodium illinoense*		X				X				
Indian blanket	*Gaillardia aristata*						X	X		X	
Indian breadroot scurfpea	*Psoralea esculenta*	X	X	X			X	X			
Ironweed	*Veronia fasciculata*		X		X				X		X
Joe-pye weed	*Eupatorium maculatum*		X		X				X		X
Leadplant	*Amorpha canescens*	X					X	X		X	
Maximilian sunflower	*Helianthus maximiliani*	X	X	X	X		X				X
Meadow blazing star	*Liatris ligulistylis*	X	X	X	X						X
New England aster	*Symphyotrichum novae-angliae*	X		X			X				
Plains coreopsis	*Coreopsis tinctoria*		X		X				X		X
Prairie cinquefoil	*Potentilla arguta*	X	X	X			X	X			
Prairie coneflower	*Ratibida columnifera*	X		X			X				
Prairie rose	*Rosa arkansana*	X					X				
Purple prairie clover	*Petalostemum purpurea*	X		X			X	X		X	
Rough blazing star	*Liatris aspera*	X	X	X	X		X	X		X	X
Round-headed bush clover	*Lespedeza capitata*	X		X			X				
Shell-leaf penstemon	*Penstemon grandiflorus*	X	X	X	X		X	X		X	X
Showy partridgepea	*Cassia fasiculata*	X	X				X				
Stiff goldenrod	*Solidago rigida*	X		X			X	X		X	
Stiff sunflower	*Helianthus pauciflorus*	X	X	X	X		X				X
Swamp milkweed	*Asclepias incarnata*		X		X				X		X
Tall meadow rue	*Thalictrum dasycarpum*	X	X	X	X						X
Thickspike gayfeather	*Liatris pycnostachya*	X	X		X						X

[1/] All eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.

[2/] If site is a wetland, refer to Wetland Restoration (657).

[3/] No individual forb or shrub species should make up more than three percent of the mixture.

TABLE 6A. PRAIRIE RESTORATION (Continued)
TALL-GRASS PRAIRIE REGION – MLRA'S 102A, 102B, 102C, 56
SPECIES SELECTION[1/]

		Minimum and maximum percentage of forbs and shrubs and adaptability by ecological site[2/]									
		Cy, Ly	CyOv, LyOv	Cp	LSb, SSb	SL	Sa, Sy	Sw, SwLy, SwC, TU	SM, WL, WM	SwG, VSw	Sb
	FORBS & SHRUBS[3/]	**10-30**	**5-35**	**10-25**	**10-20**	**0**	**10-30**	**10-30**	**10-25**	**10-30**	**10-20**
Common Name	**Scientific Name**										
Water plantain	*Alisma subcordatum*								X		
Western snowberry	*Symphoricarpos occidentalis*	X	X				X				
Western yarrow	*Achillea millefolium*	X	X	X	X		X	X		X	X
White prairie clover	*Petalostemum candidum*	X		X			X	X		X	
Wild bergamot	*Monarda fistulosa*	X	X	X	X		X	X		X	X

[1/] All eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.

[2/] If site is a wetland, refer to Wetland Restoration (657).

[3/] No individual forb or shrub species should make up more than three percent of the mixture.

TABLE 6B. PRAIRIE RESTORATION
MIXED-GRASS PRAIRIE REGION – MLRA'S 53B, 53C, 54, 55B, 55C, 58D, 60A, 61, 63A, 63B, 64, 65
SPECIES SELECTION[1/]

		Minimum and maximum percentage of grasses and grass-likes by species and ecological site[2/]																
		Cy, Ly	BOv, COv, LOv	Cp	CD	CSa	CSv	DC, SDC	LT	LSb, SSb, Sb	SL, SU	Sa, Sy	SwLy, SwC, TU	SM, WL, WM	SwG, VSw	PC	SH	TCp
GRASSES & GRASS-LIKES		**70-90**	**65-90**	**75-90**	**100**	**80-90**	**75-90**	**70-95**	**80-95**	**80-90**	**100**	**70-90**	**70-90**	**75-90**	**70-90**	**90-100**	**70-90**	**80-100**
Common Name	**Scientific Name**																	
Alkali sacaton	*Sporobolus airoides*										0-30							0-20
American sloughgrass	*Beckmannia syzigachne*													0-10				
Big bluestem	*Andropogon gerardii*	0-15	10-40			0-10	0-20		0-20	15-50		0-20	0-20			0-20	0-20	
Blue grama	*Bouteloua gracilis*	0-20	0-10	10-30		0-20	0-20		0-10	0-10	0-20	0-20	10-30		10-40		0-20	10-40
Bluejoint reedgrass	*Calamagrostis canadensis*													0-25				
Buffalograss	*Bouteloua dactyloides*	0-10		0-10			0-10								0-10		0-10	
Canada wildrye	*Elymus canadensis*		0-10															
Green needlegrass	*Nassella viridula*	10-40	10-50	0-30				10-40	20-50	0-10			0-25			0-20	0-15	0-10
Indiangrass	*Sorghastrum nutans*	0-10	0-10			0-20			0-10	0-20		0-20						
Inland Saltgrass	*Distichlis spicata*										20-70							
Little bluestem	*Schizachyrium scoparium*	0-20	0-20	0-10		10-40	10-40		10-25	10-40		0-40	10-50		10-30	10-20	10-40	
Needleandthread	*Hesperostipa comata*	0-20	0-10	0-20					0-20			0-25	0-20		0-30			
Nuttall's alkaligrass	*Puccinella nuttalliana*										0-30							0-20
Porcupine grass	*Hesperostipa spartea*	0-20	0-10									0-20	0-10					
Prairie cordgrass	*Spartina pectinata*													0-60				
Prairie dropseed	*Sporobolus heterolepis*																0-10	
Prairie Junegrass	*Koeleria macrantha*	0-5	0-5	0-5								0-10	0-10		0-10			
Prairie sandreed	*Calamovilfa longifolia*	0-10	0-20	0-20		10-40	0-10					10-40	0-10		0-20	10-30		
Sand bluestem	*Andropogon hallii*					10-40						0-30				10-25		
Sideoats grama	*Bouteloua curtipendula*	10-30	0-20	0-20		0-20		0-20	0-25	0-20		0-20	10-40		0-30	0-20	0-20	0-20
Slender wheatgrass	*Elymus trachycaulus*	0-10	0-10	0-10						0-10	0-10	0-10	0-10	0-10	0-10			
Slough sedge	*Carex atherodes*													0-60				
Switchgrass	*Panicum virgatum*		0-20			0-20			0-25	0-20	0-20	0-20				0-20		
Virginia wildrye	*Elymus virginicus*		0-10							0-10								
Western wheatgrass	*Pascopyrum smithii*	0-30	10-50	10-40	100		10-30	10-80	0-50	0-20	20-80	0-20	0-30	0-10	0-20	0-25	0-10	10-60
Whitetop	*Scolochloa festucacea*													0-50				

[1/] All eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.

[2/] If site is a wetland, refer to Wetland Restoration (657).

TABLE 6B. PRAIRIE RESTORATION
MIXED-GRASS PRAIRIE REGION – MLRA'S 53B, 53C, 54, 55B, 55C, 58D, 60A, 61, 63A, 63B, 64, 65
SPECIES SELECTION[1/]

		Minimum and maximum percentage of forbs and shrubs and adaptability by ecological site[2/]																
		Cy, Ly	BOv, COv, LOv	Cp	CD	CSa	CSv	DC, SDC	LT	LSb, SSb, Sb	SL, SU	Sa, Sy	SwLy, SwC, TU	SM, WL, WM	SwG, VSw	PC	SH	TCp
	FORBS & SHRUBS[3/]	10-30	10-35	10-25	0	10-20	10-25	5-30	5-20	10-20	0-10	10-30	10-30	10-25	10-30	0-10	10-30	0-20
Common Name	**Scientific Name**																	
American licorice	*Glycyrrhiza lepidota*		X							X				X				
Big sagebrush[4]	*Artemisia tridentata*	X	X	X				X	X				X					X
Black Samson	*Echinacea angustifolia*	X		X		X	X		X	X		X	X		X		X	
Black-eyed Susan	*Rudbeckia hirta*	X		X		X	X		X	X		X	X		X		X	
Blanket flower	*Gaillardia aristata*	X		X		X	X		X			X						
Blue vervain	*Verbena hastata*		X							X				X				
Boneset	*Eupatorium perfoliatum*		X							X				X				
Buffaloberry	*Shepherdia argentea*												X					
Canada milkvetch	*Astragalus canadensis*	X		X		X	X		X			X						
Canada tick trefoil	*Desmodium canadense*	X	X	X		X	X		X	X		X						
Chokecherry	*Prunus virginiana*												X					
Common milkweed	*Asclepias syriaca*	X	X	X		X	X		X	X		X	X	X			X	
Compass plant	*Silphium laciniatum*	X	X				X		X	X			X				X	
Cudweed sagewort	*Artemisia ludoviciana*	X	X	X		X	X	X	X	X		X						
Dotted gayfeather	*Liatris punctata*	X		X		X	X		X			X	X		X	X	X	X
Dwarf indigo	*Amorpha nana*	X				X	X		X			X	X		X	X	X	
False indigo	*Amorpha fruticosa*		X															
False sunflower	*Heliopsis helianthoides*	X	X	X		X	X		X	X		X						
Fragrant giant hyssop	*Agastache foeniculum*	X	X	X		X	X		X	X		X	X		X		X	
Fringed sagewort	*Artemisia frigida*	X	X	X					X				X					X
Gardner's saltbush[4]	*Atriplex gardneri*										X							
Gray goldenrod	*Solidago nemoralis*	X		X		X	X		X			X	X		X		X	
Groundplum milkvetch	*Astragalus crassicarpus*	X	X	X		X	X		X			X	X		X	X	X	X
Heath aster	*Symphyotrichum ericoides*	X	X	X		X	X		X			X	X				X	X
Hoary vervain	*Verbena stricta*	X	X	X		X	X		X	X		X	X		X		X	X
Illinois bundleflower	*Desmanthus illinoensis*	X		X		X	X		X			X	X		X		X	
Indian blanket	*Gaillardia aristata*					X						X	X		X		X	X
Breadroot scurfpea	*Psoralea esculenta*	X	X	X		X	X	X	X			X	X			X	X	X
Ironweed	*Veronia fasciculate*		X							X				X				
Joe-pye weed	*Eupatorium maculatum*		X							X				X				

TABLE 6B. PRAIRIE RESTORATION
MIXED-GRASS PRAIRIE REGION – MLRA'S 53B, 53C, 54, 55B, 55C, 58D, 60A, 61, 63A, 63B, 64, 65
SPECIES SELECTION[1/]

		Minimum and maximum percentage of forbs and shrubs and adaptability by ecological site[2/]																
		Cy, Ly	BOv, COv, LOv	Cp	CD	CSa	CSv	DC, SDC	LT	LSb, SSb, Sb	SL, SU	Sa, Sy	SwLy, SwC, TU	SM, WL, WM	SwG, VSw	PC	SH	TCp
FORBS & SHRUBS[3/]		**10-30**	**10-35**	**10-25**	**0**	**10-20**	**10-25**	**5-30**	**5-20**	**10-20**	**0-10**	**10-30**	**10-30**	**10-25**	**10-30**	**0-10**	**10-30**	**0-20**
Common Name	**Scientific Name**																	
Leadplant	*Amorpha canescens*	X				X	X		X			X	X		X	X	X	
Maximilian sunflower	*Helianthus maximiliani*	X	X	X		X	X		X	X		X						
New England aster	*Symphyotrichum novae-angliae*	X		X		X	X		X			X						
Plains coreopsis	*Coreopsis tinctoria*		X							X				X				
Prairie cinquefoil	*Potentilla arguta*	X	X	X		X	X		X			X	X				X	
Prairie coneflower	*Ratibida columnifera*	X		X		X	X		X			X						
Prairie rose	*Rosa arkansana*	X				X	X	X	X			X						
Purple prairie clover	*Petalostemum purpurea*	X		X		X	X		X			X	X		X		X	X
Rough blazing star	*Liatris aspera*	X	X	X		X	X		X	X		X	X		X		X	X
Round-head bush clover	*Lespedeza capitata*	X		X		X	X		X			X						
Sand sagebrush[4/]	*Artemisia filifolia*											X						
Shell-leaf penstemon	*Penstemon grandiflorus*	X	X	X		X	X		X	X		X	X		X		X	
Silver sagebrush	*Artemisia cana*		X	X					X				X					X
Stiff goldenrod	*Solidago rigida*	X		X		X	X	X	X			X	X		X	X	X	X
Stiff sunflower	*Helianthus pauciflorus*	X	X	X		X	X	X	X	X		X				X		
Swamp milkweed	*Asclepias incarnata*		X							X				X				
Tall meadow rue	*Thalictrum dasycarpum*	X	X	X			X		X	X								
Water plantain	*Alisma subcordatum*													X				
Western snowberry	*Symphoricarpos occidentalis*	X	X			X	X		X			X						
Western yarrow	*Achillea millefolium*	X	X	X		X	X	X	X	X		X	X		X	X	X	X
White prairie clover	*Petalostemum candidum*	X		X		X	X		X			X	X		X		X	X
Wild bergamot	*Monarda fistulosa*	X	X	X		X	X		X	X		X	X		X		X	X
Winterfat[4]	*Krascheninnikovia lanata*	X						X			X		X					

[1/] All eligible species are not included in this table. Plant species found to be native to a given ecological site will be allowable in a seeding mixture.

[2/] If site is a wetland, refer to Wetland Restoration (657).

[3/] No individual forb or shrub species should make up more than three percent of the mixture.

[4/] This species should only be used in MLRA's 58D, 61, and 60A (13-16 inch precipitation zone).

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 102A, 102B, 102C

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Tame Sod Forming Grass					
Creeping foxtail	NS	NS	NS	2	1
Intermediate wheatgrass	1	1	2	2	NS
Pubescent wheatgrass	1	1	1	2	NS
Smooth bromegrass	1	1	2	NS	NS
Native Sod Forming Grass					
Big bluestem	1	1	1	NS	2
Buffalograss	NS	NS	NS	NS	NS
Indiangrass	1	1	1	NS	2
Prairie cordgrass	NS	NS	NS	2	1
Prairie sandreed	NS	NS	1	NS	NS
Reed canarygrass	NS	NS	NS	2	1
Sand bluestem	NS	NS	1	NS	NS
Sideoats grama	1	1	1	NS	NS
Streambank/thickspike wheatgrass	NS	NS	NS	NS	NS
Switchgrass	1	1	1	NS	2
Western wheatgrass	1	1	2	1	2
Whitetop	NS	NS	NS	NS	1
Tame Bunchgrass					
Hard fescue	NS	NS	NS	NS	NS
Meadow brome	1	1	2	NS	NS
Tall wheatgrass	NS	NS	NS	1	2
Timothy	2	2	NS	NS	NS
Native Bunchgrass					
Alkali sacaton	NS	NS	NS	1	NS
Blue grama	NS	NS	NS	NS	NS
Canada wildrye	2	2	2	NS	2
Green needlegrass	1	1	2	NS	NS
Little bluestem	2	1	1	NS	NS
Mountain brome	NS	NS	NS	NS	NS
Nuttall's alkaligrass	NS	NS	NS	1	NS
Slender wheatgrass	2	2	2	NS	NS
Virginia wildrye	NS	NS	NS	NS	NS
Native Legumes					
Illinois bundleflower	1	1	2	NS	NS
Purple prairie clover	1	1	1	NS	NS
White prairie clover	1	1	1	NS	NS
Canada milkvetch	1	1	1	NS	NS

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 102A, 102B, 102C (Continued)

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Introduced Legumes					
Alfalfa	1	1	1	NS	NS
Alsike clover	2	2	2	NS	NS
Birdsfoot trefoil	1	1	1	NS	NS
Cicer milkvetch	NS	NS	NS	NS	NS
Red clover	1	1	2	NS	NS
Sainfoin	NS	NS	NS	NS	NS
Small burnet	NS	NS	NS	NS	NS
Native Shrubs					
Leadplant	2	1	1	NS	NS
Western snowberry	2	1	2	NS	NS

1 – Preferred species for the site; 2 – second choice species for the site; NS – not suited for the site. All seeding rates for this practice are double those found in Table 2.

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 53B, 53C, 55B, 55C, 63B, 66

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Tame Sod Forming Grass					
Creeping foxtail	NS	NS	NS	2	1
Intermediate wheatgrass	1	1	2	2	NS
Pubescent wheatgrass	1	1	1	2	NS
Smooth bromegrass	1	1	2	NS	NS
Native Sod Forming Grass					
Big bluestem	1	1	1	NS	2
Buffalograss	NS	NS	NS	NS	NS
Indiangrass	1	1	1	NS	2
Prairie cordgrass	NS	NS	NS	2	1
Prairie sandreed	NS	NS	1	NS	NS
Reed canarygrass	NS	NS	NS	2	1
Sand bluestem	NS	NS	1	NS	NS
Sideoats grama	1	1	1	NS	NS
Streambank/thickspike wheatgrass	NS	NS	NS	NS	NS
Switchgrass	1	1	1	NS	2
Western wheatgrass	1	1	2	1	2
Whitetop	NS	NS	NS	NS	1
Tame Bunchgrass					
Hard fescue	NS	NS	NS	NS	NS
Meadow brome	1	1	2	NS	NS
Tall wheatgrass	NS	NS	NS	1	2
Timothy	NS	NS	NS	NS	NS
Native Bunchgrass					
Alkali sacaton	NS	NS	NS	1	NS
Blue grama	1	1	2	NS	NS
Canada wildrye	2	2	2	NS	2
Green needlegrass	1	1	2	NS	NS
Little bluestem	2	1	1	NS	NS
Mountain brome	NS	NS	NS	NS	NS
Nuttall's alkaligrass	NS	NS	NS	1	NS
Slender wheatgrass	2	2	2	NS	NS
Virginia wildrye	NS	NS	NS	NS	NS
Native Legumes					
Illinois bundleflower	2	2	2	NS	NS
Purple prairie clover	1	1	1	NS	NS
White prairie clover	1	1	1	NS	NS
Canada milkvetch	1	1	1	NS	NS

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 53B, 53C, 55B, 55C, 63B, 66 (Continued)

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Introduced Legumes					
Alfalfa	1	1	1	NS	NS
Alsike clover	2	2	2	NS	NS
Birdsfoot trefoil	1	1	1	NS	NS
Cicer milkvetch	NS	NS	NS	NS	NS
Red clover	1	1	2	NS	NS
Sainfoin	NS	NS	NS	NS	NS
Small burnet	NS	NS	NS	NS	NS
Native Shrubs					
Leadplant	2	1	1	NS	NS
Western snowberry	2	1	2	NS	NS

1 – Preferred species for the site; 2 – second choice species for the site; NS – not suited for the site. All seeding rates for this practice are double those found in Table 2.

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 54, 63A, 64, 65

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Tame Sod Forming Grass					
Creeping foxtail	NS	NS	NS	NS	1
Intermediate wheatgrass	1	1	2	2	NS
Pubescent wheatgrass	1	1	1	2	NS
Smooth bromegrass	1	1	2	NS	NS
Native Sod Forming Grass					
Big bluestem	1	1	1	NS	2
Buffalograss	1	2	NS	NS	NS
Indiangrass	2	2	1	NS	2
Prairie cordgrass	NS	NS	NS	2	1
Prairie sandreed	NS	NS	1	NS	NS
Reed canarygrass	NS	NS	NS	NS	1
Sand bluestem	NS	NS	1	NS	NS
Sideoats grama	1	1	1	NS	NS
Streambank/thickspike wheatgrass	2	2	2	NS	NS
Switchgrass	2	2	2	NS	NS
Western wheatgrass	1	1	2	1	2
Whitetop	NS	NS	NS	NS	NS
Tame Bunchgrass					
Hard fescue	1	1	NS	NS	NS
Meadow brome	1	1	2	NS	NS
Tall wheatgrass	NS	NS	NS	1	2
Timothy	NS	NS	NS	NS	NS
Native Bunchgrass					
Alkali sacaton	NS	NS	NS	1	NS
Blue grama	1	1	2	NS	NS
Canada wildrye	NS	NS	NS	NS	NS
Green needlegrass	1	1	2	NS	NS
Little bluestem	2	1	1	NS	NS
Mountain brome	NS	NS	NS	NS	NS
Nuttall's alkaligrass	NS	NS	NS	1	NS
Slender wheatgrass	2	2	2	NS	NS
Virginia wildrye	NS	NS	NS	NS	NS
Native Legumes					
Illinois bundleflower	NS	NS	NS	NS	NS
Purple prairie clover	1	1	1	NS	NS
White prairie clover	1	1	1	NS	NS
Canada milkvetch	1	1	1	NS	NS

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 54, 63A, 64, 65 (Continued)

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Introduced Legumes					
Alfalfa	1	1	1	NS	NS
Alsike clover	1	1	1	NS	NS
Birdsfoot trefoil	NS	NS	NS	NS	NS
Cicer milkvetch	NS	NS	NS	NS	NS
Red clover	2	2	NS	NS	NS
Sainfoin	1	1	1	NS	NS
Small burnet	NS	NS	NS	NS	NS
Native Shrubs					
Leadplant	2	1	1	NS	NS
Western snowberry	2	1	2	NS	NS

1 – Preferred species for the site; 2 – second choice species for the site; NS – not suited for the site. All seeding rates for this practice are double those found in Table 2.

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 58D, 60A, 61

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Tame Sod Forming Grass					
Creeping foxtail	NS	NS	NS	NS	1
Intermediate wheatgrass	1	1	2	2	NS
Pubescent wheatgrass	1	1	1	2	NS
Smooth bromegrass	1	1	2	NS	NS
Native Sod Forming Grass					
Big bluestem	2	2	1	NS	2
Buffalograss	1	2	NS	NS	NS
Indiangrass	NS	NS	2	NS	2
Prairie cordgrass	NS	NS	NS	2	1
Prairie sandreed	NS	NS	1	NS	NS
Reed canarygrass	NS	NS	NS	NS	1
Sand bluestem	NS	NS	1	NS	NS
Sideoats grama	1	1	1	NS	NS
Streambank/thickspike wheatgrass	1	1	1	NS	NS
Switchgrass	NS	NS	2	NS	NS
Western wheatgrass	1	1	2	1	2
Whitetop	NS	NS	NS	NS	NS
Tame Bunchgrass					
Hard fescue	1	1	NS	NS	NS
Meadow brome	1	1	2	NS	NS
Tall wheatgrass	NS	NS	NS	1	2
Native Bunchgrass					
Alkali sacaton	NS	NS	NS	1	NS
Blue grama	1	1	2	NS	NS
Canada wildrye	NS	NS	NS	NS	NS
Green needlegrass	1	1	2	NS	NS
Little bluestem	2	1	1	NS	NS
Mountain brome	NS	NS	NS	NS	NS
Nuttall's alkaligrass	NS	NS	NS	1	NS
Slender wheatgrass	2	2	2	NS	NS
Virginia wildrye	NS	NS	NS	NS	NS
Native Legumes					
Illinois bundleflower	NS	NS	NS	NS	NS
Purple prairie clover	1	1	1	NS	NS
White prairie clover	1	1	1	NS	NS
Canada milkvetch	1	1	1	NS	NS

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA'S 58D, 60A, 61 (Continued)

Species/Growth Form	Determining Soil Property				
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Saline	Wet Soils
Introduced Legumes					
Alfalfa	1	1	1	NS	NS
Alsike clover	1	1	1	NS	NS
Birdsfoot trefoil	NS	NS	NS	NS	NS
Cicer milkvetch	1	1	1	NS	NS
Red clover	2	2	NS	NS	NS
Sainfoin	1	1	1	NS	NS
Small burnet	1	1	1	NS	NS
Native Shrubs					
Leadplant	2	1	1	NS	NS
Western snowberry	2	1	2	NS	NS

1 – Preferred species for the site; 2 – second choice species for the site; NS – not suited for the site. All seeding rates for this practice are double those found in Table 2.

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA 62

Species/Growth Form	Determining Soil Property			
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Wet Soils
Tame Sod Forming Grass				
Creeping foxtail	NS	NS	NS	1
Intermediate wheatgrass	2	2	2	NS
Pubescent wheatgrass	2	2	2	NS
Smooth bromegrass	1	1	2	NS
Native Sod Forming Grass				
Big bluestem	1	1	1	2
Buffalograss	NS	NS	NS	NS
Indiangrass	NS	NS	2	2
Prairie cordgrass	NS	NS	NS	1
Prairie sandreed	NS	NS	1	NS
Reed canarygrass	NS	NS	NS	1
Sand bluestem	NS	NS	1	NS
Sideoats grama	1	1	1	NS
Streambank/thickspike wheatgrass	1	1	1	NS
Switchgrass	NS	NS	2	NS
Western wheatgrass	1	1	2	2
Whitetop	NS	NS	NS	NS
Tame Bunchgrass				
Hard fescue	1	1	NS	NS
Meadow brome	2	2	2	NS
Tall wheatgrass	NS	NS	NS	2
Timothy	1	1	1	NS
Native Bunchgrass				
Alkali sacaton	NS	NS	NS	NS
Blue grama	1	1	2	NS
Canada wildrye	2	2	2	NS
Green needlegrass	1	1	2	NS
Little bluestem	2	1	1	NS
Mountain brome	1	1	1	NS
Nuttall's alkaligrass	NS	NS	NS	NS
Slender wheatgrass	1	1	2	NS
Virginia wildrye	1	1	1	NS
Native Legumes				
Illinois bundleflower	NS	NS	NS	NS
Purple prairie clover	1	1	1	NS
White prairie clover	1	1	1	NS
Canada milkvetch	1	1	1	NS

TABLE 7. CRITICAL AREA PLANTING (342)
SPECIES ADAPTED TO GENERALIZED PLANTING SITES
MLRA 62 (Continued)

Species/Growth Form	Determining Soil Property			
	Clayey Texture	Loamy or Silty Texture	Sandy Texture	Wet Soils
Introduced Legumes				
Alfalfa	NS	NS	NS	NS
Alsike clover	1	1	1	NS
Birdsfoot trefoil	NS	NS	NS	NS
Cicer milkvetch	1	1	1	NS
Red clover	1	1	2	NS
Sainfoin	1	1	1	NS
Small burnet	1	1	1	NS
Native Shrubs				
Leadplant	2	1	1	NS
Western snowberry	2	1	2	NS

1 – Preferred species for the site; 2 – second choice species for the site; NS – not suited for the site. All seeding rates for this practice are double those found in Table 2.

TABLE 8. SUGGESTED SEEDING MIXTURES FOR VEGETATED TREATMENT AREAS (635)

MLRA	Species	% in Mixture	Lbs/PLS/Acre	Predominant Site Conditions
102A, 102B, 102C	smooth brome meadow brome orchardgrass creeping foxtail	20 20 30 30	6.4 13.0 4.0 4.2	Good soils with **short** duration of saturated soils
102A, 102B, 102C, 55B, 55C, 53B, 53C, 56	smooth brome intermediate wheatgrass or pubescent wheatgrass creeping foxtail	30 20 50	9.6 8.0 7.0	Good soils with **long** duration of saturated soils
102A, 102B, 102C, 55B, 55C, 53B, 53C, 63A, 63B, 54, 58D, 60A, 64, 65, 66	tall wheatgrass western wheatgrass intermediate wheatgrass or pubescent wheatgrass creeping foxtail	35 30 25 10	17.8 11.6 10.0 1.4	**Saline soils** with potential to reach EC > 4.0 mmhos/cm
63A, 63B, 54, 58D, 60A, 64, 65, 66	smooth brome intermediate wheatgrass or pubescent wheatgrass western wheatgrass slender wheatgrass prairie cordgrass creeping foxtail	20 30 20 10 10 10	5.2 10.0 6.2 2.0 2.8 1.4	Good soils with short to moderately saturated soils in western South Dakota
102A, 102B, 102C, 55B, 55C, 53B, 53C, 63A, 63B, 54, 58D, 60A, 64, 65, 66	big bluestem switchgrass western wheatgrass	40 40 20	10.0 5.4 6.2	Sites or cells that anticipate major discharge events in summer.

Figure 1. Grass seedling morphology

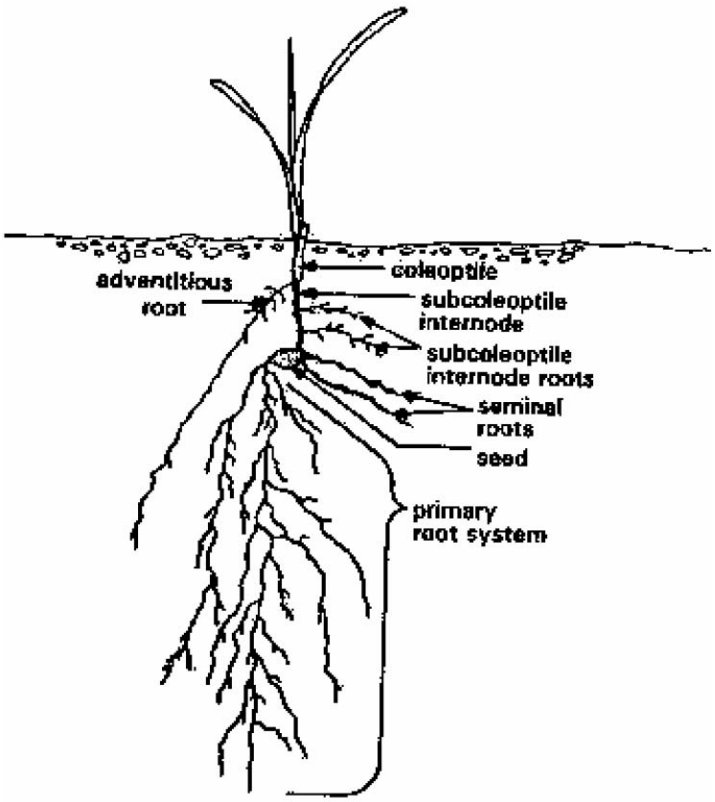
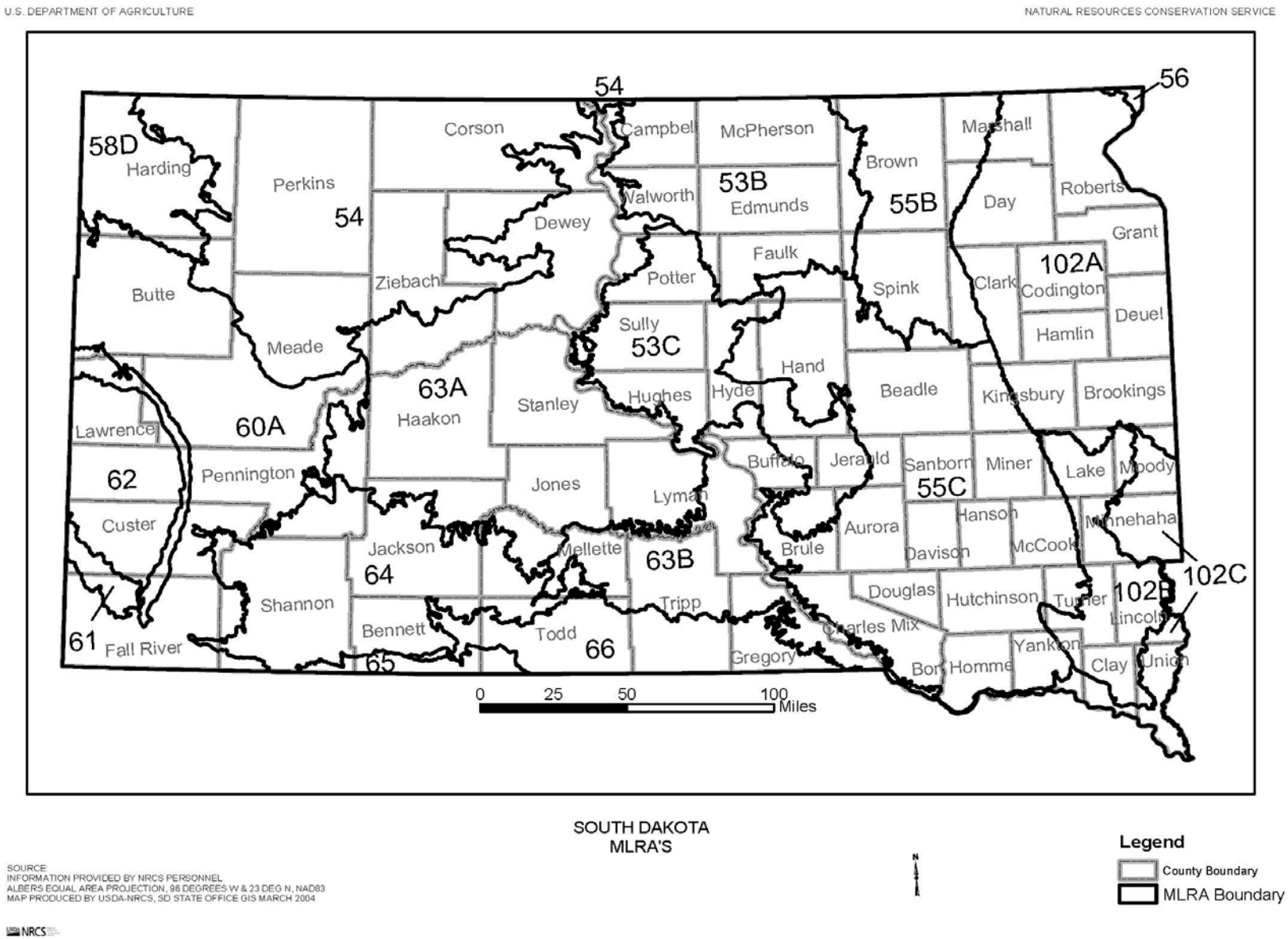
Figure 2. Major Land Resource Areas (MLRA) of South Dakota